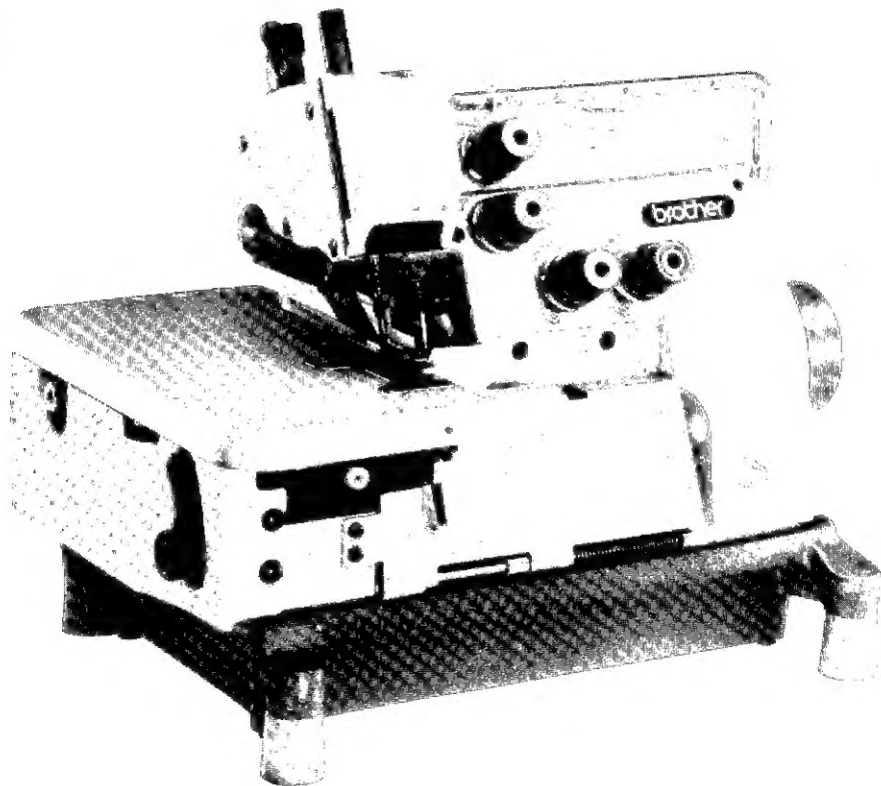


SERVICE MANUAL

FOR

**BROTHER MODEL EF4-B511, 531
MA4-B551**



**BROTHER INDUSTRIES, LTD.,
NAGOYA, JAPAN.**

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1. FEATURES

1. A fulley automatic lubricating system and a needle cooler assure reliable high-speed sewing.
2. Pushbutton controls permit easy adjustment of stitch length with a simple setting of the face plate scale.
3. Differential feed ratio can be easily adjusted with a lever without using a tool.
4. Many devices are provided and can be easily used as replacements or changed as required for particular uses.
5. The longitudinal movement of the double-chain stitch looper can be regulated by adjusting the clearance between the needle and looper as appropriate to uses.
6. High-lift specifications-- 7mm in presser foot rise (6.5mm for safety stitch and denim specifications) and 7mm in maximum stitch width-- are available for denim, bulky and other thick materials.
7. The upper knife is a flat blade with an extra-hard edge so it will last long.
8. Blade engaging angle can be easily adjusted for sharp cutting performance.
9. Oil level in the oil pan can be easily checked with the special oil gauge on the front.
Lubrication can be checked through the oil inlet cap on the top cover.
10. Superb design and colour brighten working environment and ensure to lessen the operator's fatigue.

SPECIFICATION

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EF4-B511-

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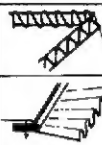




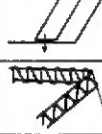
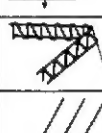


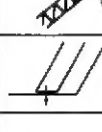
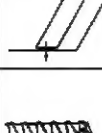





Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch (mm) of feed dog	Differential Type of feed dog	Needle (DC×1)	Maximum sewing speed (spm)	Usage (material)	Attachment
001-3		1	3	—	3	3.6	0.6~1.8	6	1.8		#11	6500	Thin, medium	—
-4					4								Knitted underwear, shirts.	
-5					5								Sports wear	
-6					6									
002-5		1	3	—	5	2.5	1.3~4	7	2		#14	6000	Bulky knit	—
-6					6								Sweater	
-7					7								Cardigan Bulky sweater	
003-3		1	3	—	3	3.6	0.6~1.8	6	1.8		#9	6500	Blind hemming	•Blind hemming ruler
-4					4								Knitted underwear, shirts.	
-5					5								Tee shirts	
004-3		1	2	—	3	3.6	0.6~1.8	6	1.8		#9	6500	Blind hemming	•Blind hemming ruler
-4					4								Knitted underwear, shirts.	
-5					5								Tee shirts	
005-3		1	2	—	3	3.6	0.6~1.8	4	1.8		#14	6000	Serging	•Edge hemming ruler
-4					4								Trousers	
-5					5								Skirts	
-6					6									
006-3		1	3	—	3	3.6	0.6~1.8	4	1.8		#14	6000	Serging	•Edge hemming ruler
-4					4								Trousers	
-5					5								Skirts	
-6					6									
007-2		1	3	—	2	3.6	0.6~1.8	6	1.8		#11	6500	Curling	—
-4					4								Handkerchief	
★													Scarf	
008-5		1	3	—	5	3.3	1~3	5	1.8		#11	6000	Ruffling	•Ruffler
★													Coats for women & children. Negligee	

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Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch (mm) of feed dog	Differential Type of feed dog	Needle (DC×1)	Maximum sewing speed (spm)	Usage (material)	Attachment
009-5		1	3	—	5	3.3	1~3	5	1.6		# 11	6000	Ruffling (w/piping) Coats for women & children. Negligee	•Wrapper •Ruffler •tape-winder
★														
010-3		1	3	—	3	3.6	0.6~1.8	6	1.6		# 11	6500	Thin, medium taping	•Tape-guide
-4					4								Knitted underwear, shirts.	
-5					5								Tee shirts	
-6					6									
011-5		1	3	—	5	2.5	1.3~4	7	2		# 14	6000	Bulky knit taping	•Tape-guide
-6					6								Sweater	
-7					7								Cardigan Bulky sweater	
012-3		1	3	—	3	3.6	0.6~1.8	6	1.6		# 11	6500	Backlatching	•Back tack •Thread release
-4					4								Knitted underwear, shirts.	
-5					5								Bulky sweater	
★ -6					6									











































★Extra cost of attachment will be required for the sub-class marked with asterisk.

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EF4-B531-

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Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Push (mm) of feed dog	(a)  (b) 	Needle (DCX1)	Maximum sewing speed (spm)	Usage (material)	Attachment
021-4		2	4	1.8	4	3.6	0.6~1.8	6	1.6		# 11 (DCX3)	6500	Thin	—
-5		2	4	1.8	5	3.6	0.6~1.8	6	1.6		# 11 (DCX3)	6500	Knitted & tricot underwear	
022-5		2	4	2.2	5	3.6	0.6~1.8	6	1.6		# 11	6500	Thin, medium	—
-6 -7		2	4	2.2	6 7	3.6	0.6~1.8	6	1.6		# 11	6500	Knitted underwear, shirts. Tee shirts	
023-5		2	4	2.2	5	3.6	0.6~1.8	6	1.6		# 11	6500	Thin, medium	—
-6 -7 mock		2	4	2.2	6 7	3.6	0.6~1.8	6	1.6		# 11	6500	Collared shirts Blouse	
024-5		2	4	3	5	3.6	0.6~1.8	6	1.6		# 11	6500	Thin, medium	—
		2	4	3	5	3.6	0.6~1.8	6	1.6		# 11	6500	Knitted underwear, shirts. Tee shirts	
025-6		2	4	3	6	3.6	0.6~1.8	6	1.6		# 11	6500	Thin, medium	—
		2	4	3	6	3.6	0.6~1.8	6	1.6		# 11	6500	Collared shirts Blouse	
026-4		2	4	1.8	4	2.5	1.3~4	7	1.6		# 11 (DCX3)	6000	Bulky knit	—
-5		2	4	1.8	5	2.5	1.3~4	7	1.6		# 11 (DCX3)	6000	Sweater Cardigan Bulky sweater	
027-5		2	4	2.2	5	2.5	1.3~4	7	2		# 14	6000	Bulky knit	—
-6 -7		2	4	2.2	6 7	2.5	1.3~4	7	2		# 14	6000	Sweater Cardigan Bulky sweater	
028-5		2	4	2.2	5	2.5	1.3~4	7	2		# 14	6000	Bulky knit	—
-6 -7 mock		2	4	2.2	6 7	2.5	1.3~4	7	2		# 14	6000	Sweater Cardigan Bulky sweater	
031-7		2	4	3	7	3.6	0.6~1.8	7	2.5		# 21	6000	Extra heavy	—
		2	4	3	7	3.6	0.6~1.8	7	2.5		# 21	6000	Denim Curtain Cushion	
032-7		2	4	3	7	3.6	0.6~1.8	7	2.5		# 21	6000	Extra heavy	—
		2	4	3	7	3.6	0.6~1.8	7	2.5		# 21	6000	Denim Curtain Cushion	

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Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch (mm) of feed dog	Differential Type of feed dog	Needle (DC x 1)	Maximum sewing speed (spm)	Usage (material)	Attachment
033-5		2	4	2.2	5	3.3	1~3	5	1.6	(a) (b)	# 11	6000	Ruffling Coats for women & children Negligee	• Ruffler
★														
034-5		2	4	2.2	5	3.3	1~3	5	1.6	(a) (b)	# 11	6000	Ruffling Coats for women & children Negligee	• Ruffler
★														
037-5		2	4	2.2	5	3.3	1~3	5	1.6	(a) (b)	# 11	6000	Ruffling (w/piping) Coats for women & children Blous	• Wrapper • Ruffler • Tape-winder
★														
038-5		2	4	2.2	5	3.3	1~3	5	1.6	(a) (b)	# 11	6000	Ruffling (w/piping) Coats for women & children Blouse	• Wrapper • Ruffler • Tape-winder
★														
041-5		2	4	2.2	5	3.6	0.6~1.8	6	1.6	(a) (b)	# 11	6500	Thin, medium taping Knitted underwear, shirts. Tee shirts	• Tape-guide
-6					6									
-7					7									
042-5		2	4	2.2	5	3.6	0.6~1.8	6	1.6	(a) (b)	# 11	6500	Thin, medium taping Knitted underwear, shirts. Tee shirts	• Tape-guide
-6					6									
-7					7									
045-5		2	4	2.2	5	2.5	1.3~4	7	2	(a) (b)	# 14	6000	Bulky knit taping Sweater Cardigan Bulky sweater	• Tape-guide
-6					6									
-7					7									
046-5		2	4	2.2	5	2.5	1.3~4	7	2	(a) (b)	# 14	6000	Bulky knit taping Sweater Cardigan Bulky sweater	• Tape-guide
-6					6									
-7					7									
049-5		2	4	2.2	5	3.6	0.6~1.8	6	1.6	(a) (b)	# 11	6500	Backtacking Knitted underwear, shirts. Bulky sweater	• Back tack • Thread release
★														

* Needle gauge of 3 mm is available at the request.





















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Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch (mm) of feed dog	(a) (b) Differential Type of feed dog	Needle (DC x 1)	Maximum sewing speed (spm)	Usage (material)	Attachment
061-2		2	5	2	2	3.6	0.6~1.8	4	1.6		# 11	6000	Thin	—
-3					3								Blouse	
-4					4								Shirts	
-5					5									
062-2		2	4	2	2	3.6	0.6~1.8	4	1.6		# 11	6000	Thin	—
-3					3								Blouse	
-4					4								Shirts	
-5					5									
063-3		2	5	3	3	3.6	0.6~1.8	6	1.6		# 14	6000	Thin, medium	—
-4					4								Jumper	
-5					5								Pyjamas Coats	
064-3		2	4	3	3	3.6	0.6~1.8	6	1.6		# 14	6000	Thin, medium	—
-4					4								Jumper	
-5					5								Pyjamas Coats	
065-5		2	5	5	5	3.6	0.6~1.8	6	1.6		# 16	6000	Medium, heavy	—
-6					6								Working dress,	
-7					7								trousers, coats for women	
066-5		2	4	5	5	3.6	0.6~1.8	6	1.6		# 16	6000	Medium, heavy	—
-6					6								Working dress,	
-7					7								trousers, coats for women	
067-4		2	5	2	4	3.3	1~3	5	1.6		# 14	6000	Thin, medium	•Ruffler
★													Blouse Negligee	
068-4		2	4	2	4	3.3	1~3	5	1.6		# 14	6000	Ruffling	•Ruffler
★													Blouse Negligee	
069-5		2	5	3	5	3.3	1~3	5	1.6		# 14	6000	Thin, medium	•Ruffler
★													Coats for children children & women	
070-5		2	4	3	5	3.3	1~3	5	1.6		# 14	6000	Ruffling	•Ruffler
★													Coats Blouse Negligee	

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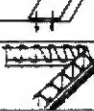
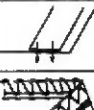
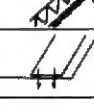


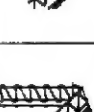


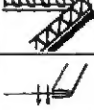

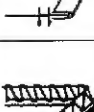


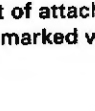

Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch (mm) of feed dog	(a) (b) Differential Type of feed dog	Needle (DC×1)	Maximum sewing speed (spm)	Usage (material)	Attachment
071-5 -6 ★		2	5	5	6	3.3	1~3	5	1.6		# 14	6000	Medium, heavy Coats for children & women	•Ruffler
072-6 ★		2	4	5	6	3.3	1~3	5	1.6		# 14	6000	Ruffling Coats for children & women	•Ruffler
073-4 ★		2	5	2	4	3.3	1~3	5	1.6		# 14	6000	Thin, medium Ruffling (w/piping) Blouse Negligee	•Wrapper •Ruffler •Tape-winder
074-4 ★		2	4	2	4	3.3	1~3	5	1.6		# 14	6000	Ruffling (w/piping) Blouse Negligee	•Wrapper •Ruffler •Tape-winder
075-5 ★		2	5	3	5	3.3	1~3	5	1.6		# 14	6000	Thin, medium Ruffling (w/piping) Coats for women & children	•Wrapper •Ruffler •Tape-winder
076-5 ★		2	4	3	5	3.3	1~3	5	1.6		# 14	6000	Ruffling (w/piping) Coats for women & children	•Wrapper •Ruffler •Tape-winder
077-6 ★		2	5	5	6	3.3	1~3	5	1.6		# 14	6000	Thin, medium Ruffling (w/piping) Coats for women & children	•Wrapper •Ruffler •Tape-winder
078-6 ★		2	4	5	6	3.3	1~3	5	1.6		# 14	6000	Ruffling (w/piping) Coats for women & children	•Wrapper •Ruffler •Tape-winder
079-3 -4 -5		2	5	2	3 4 5	3.6	0.6~1.8	6	1.6		# 11	6000	Thin, medium taping Knitted underwear Shirts Tee shirts, pajamas	•Tape-guide
080-3 -4 -5		2	4	2	3 4 5	3.6	0.6~1.8	6	1.6		# 11	6000	Thin, medium taping Knitted underwear Shirts Tee shirts, pajamas	•Tape-guide
081-3 -4 -5		2	5	3	3 4 5	3.6	0.6~1.8	6	1.6		# 14	6000	Thin, medium taping Knitted underwear Shirts Tee shirts, pajamas	•Tape-guide

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MA4-B551-

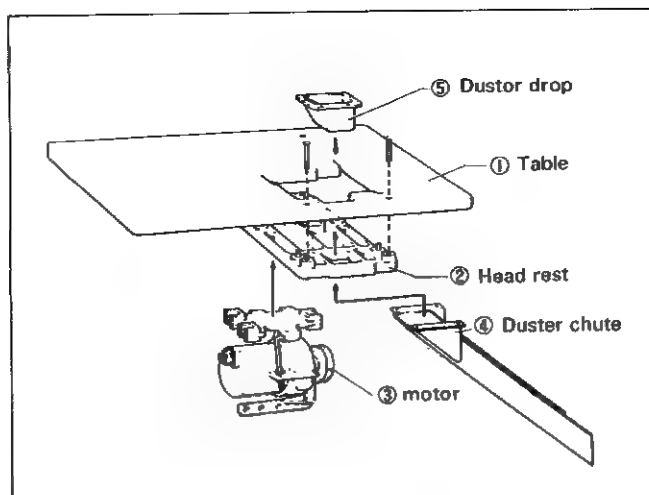
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Sub-class No.	Stitch form	No. of needle	No. of thread	Needle gauge (mm)	Bight (mm)	Maximum stitch length (mm)	Differential feed ratio	Height of presser foot	Pitch of head dog	Differential Type of feed dog	Needle (DC X 1)	Maximum sewing speed (spm)	Usage (material)	Attachment
082-3					3								Thin, medium taping	•Tape-guide
-4		2	4	3	4	3.6	0.6~1.8	6	1.6		#14	6000	Knitted underwear	
-5					5								Shirts Tee shirts, pajamas	
083-5					5								Thin, thick taping	•Tape-guide
-6		2	5	5	6	3.6	0.6~1.8	6	1.6		#16	6000	Knitted underwear	
-7					7								Shirts Tee shirts, pajamas	
084-5					5								Thin, thick taping	•Tape-guide
-6		2	4	5	6	3.6	0.6~1.8	6	1.6		#16	6000	Knitted underwear	
-7					7								Shirts Tee shirts, pajamas	
085-3					3								Extra heavy	—
★		2	5	3	3	3.6	0.6~1.8	6.5	2.5		#21	6000	Denim Curtain	
086-3					3								Extra heavy	—
★		2	5	3	3	3.6	0.6~1.8	6.5	2.5		#21	6000	Denim Curtain	
087-5					5								Extra heavy	—
-6		2	5	5	6	3.6	0.6~1.8	6.5	2.5		#21	6000	Denim Curtain	
★														
088-5					5								Extra heavy	—
-6		2	4	5	6	3.6	0.6~1.8	6.5	2.5		#21	6000	Denim Curtain	
★														
089-5					5								Thin, medium binding	•Binder •Tape-winder
★		2	5	3	5	3.6	0.6~1.8	6	1.6		#11	6000	Coats for children & women, knitted goods	
090-5					5								Thin, medium binding	•Binder •Tape-winder
★		2	4	3	5	3.6	0.6~1.8	6	1.6		#11	6000	Coats for children & women, knitted goods	
092-5					5								Extra heavy	•Serrated angle knife
-6		2	5	5	6	3.6	0.3~1.8	6.5	2.5		#21	5000	Denim Curtain	
★														
093-5					5								Extra heavy	•Serrated angle knife
-6		2	4	5	6	3.6	0.3~1.8	6.5	2.5		#21	5000	Denim Curtain	
★														

★ Extra cost of attachment will be required for the sub-class marked with asterisk.

3. INSTALLING

☆Installing the machine head

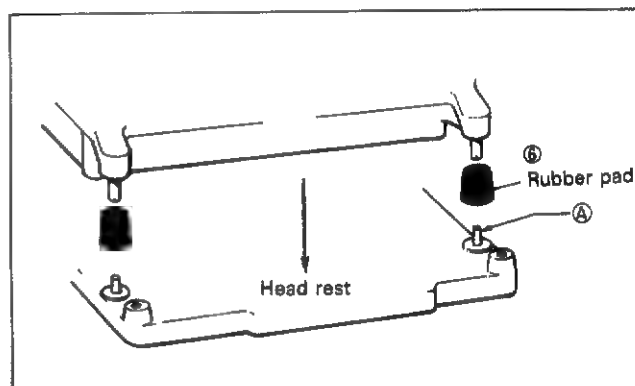


Procedures

- ① Make table top as shown in the attached table sheet.
- ② Install the head rest under the table.
- ③ Install a motor on the head rest.
(Use a bipolar 400W clutch motor.)
- ④ Install the dust chute under the head rest.
- ⑤ Install the dust drop on top of the table.
- ⑥ Fit four rubber pads onto pins (A) at bottom board.

Q'ty of screw

4
3
4
4



☆Motor pulley and belt

Pulley O.D.(mm)		90	95	100	105	110	115	120	125	130	135	140
Belt size (inches)					(36)							
					(37)							
Sewing speed (spm)	50Hz	—	—	—	—	5000		5500		6000		6500
	60Hz	5000		5500		6000	—	6500	—	—		

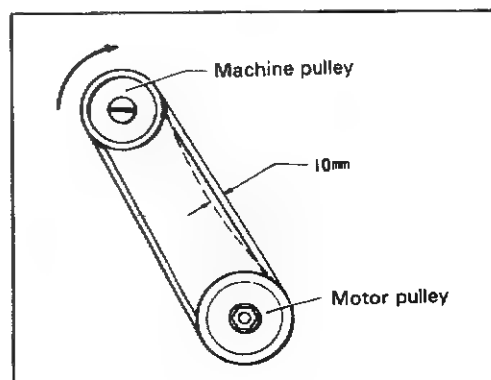
※ Run-in the machine for the first 100 hours (about 2 or 3 months) about 1,000 spm below the rated speed. Thereafter, operate the machine at the rated speed.

○ Overlock stitches: 6,500 spm (High-lift specifications 6,000 spm)

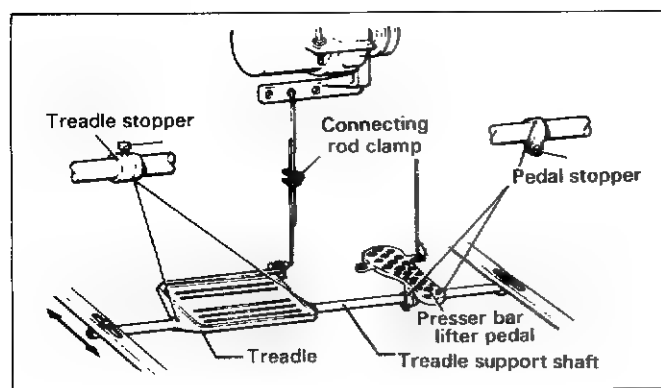
○ Safety stitches: 6,000 spm

⑧ Put the belt on the pulleys, and adjust the motor pulley height.

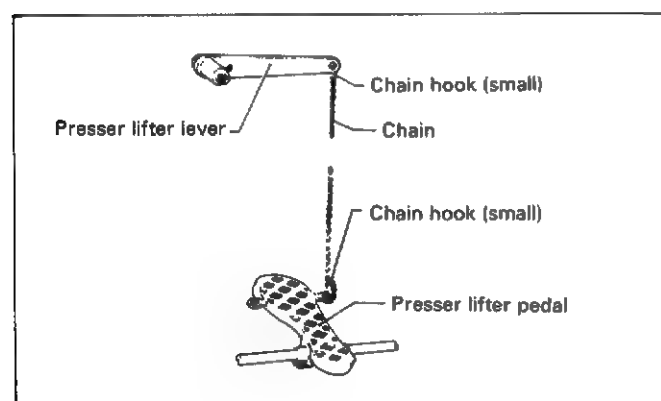
Adjust the belt to the standard tension so it can be depressed about 10mm with your fingers.



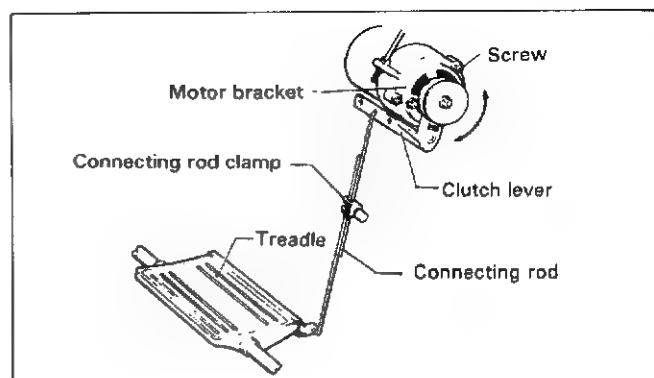
⑨ Install the presser lifter pedal on the treadle shaft as shown below.



⑩ Connect the presser lifter lever to the presser lifter pedal with a chain or the like.

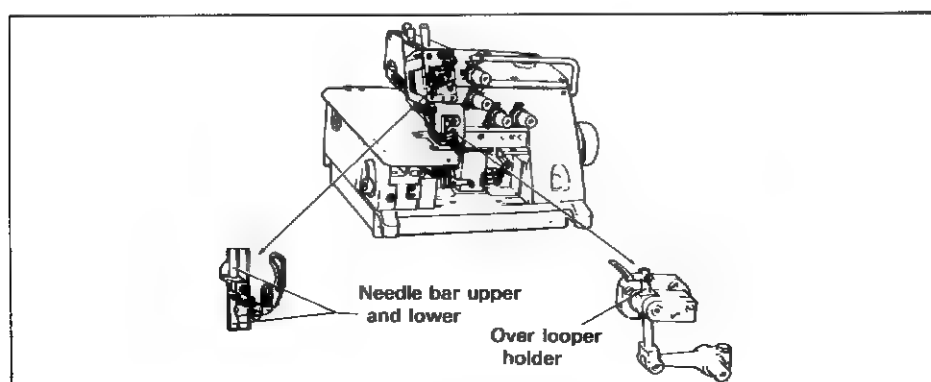
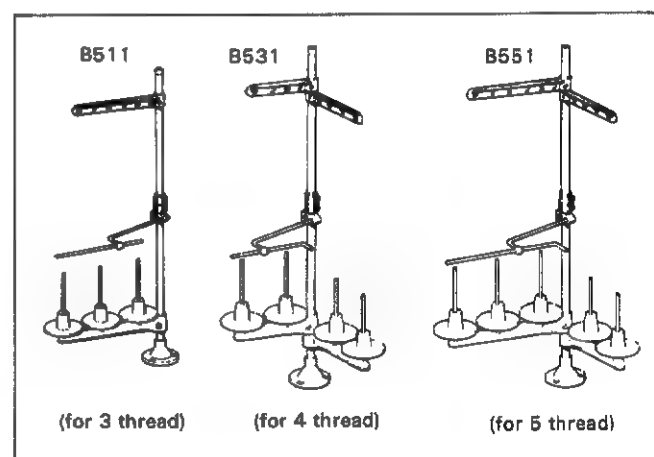


⑪ Loosen the motor bracket screws and align the clutch lever with the connecting rod so they are in line.



⑫ Install the spool stand in the right end corner of the table with screws, making sure that it will not interfere with machine operation.

☆ **Spool stand**



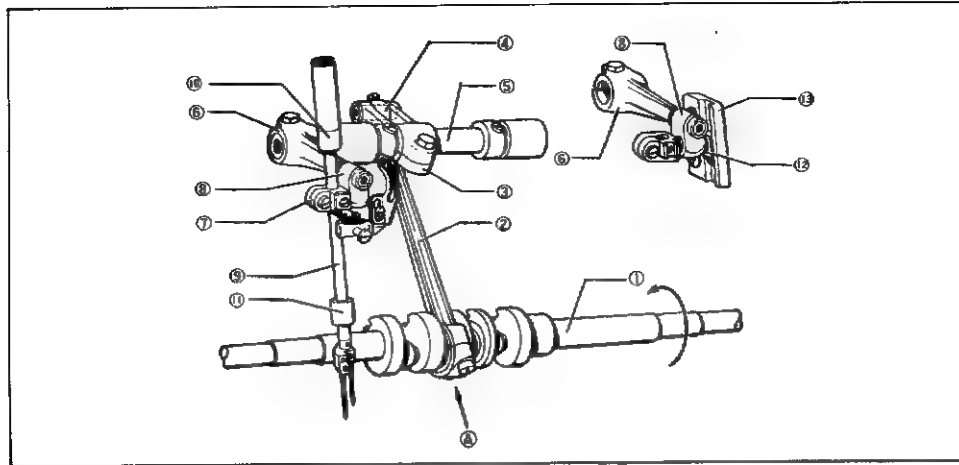
☆ **Oil and oil pan capacity**

Use BROTHER machine oil 001 (turbine oil No. 90).

The oil pan capacity 700 to 900 cubic centimeters.

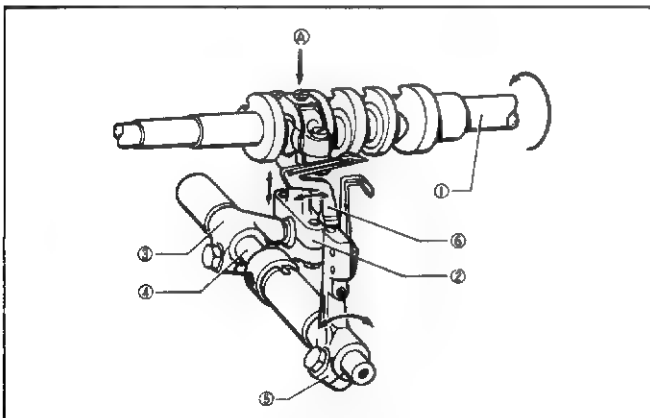
4. MECHANISM

1 NEEDLE BAR MECHANISM



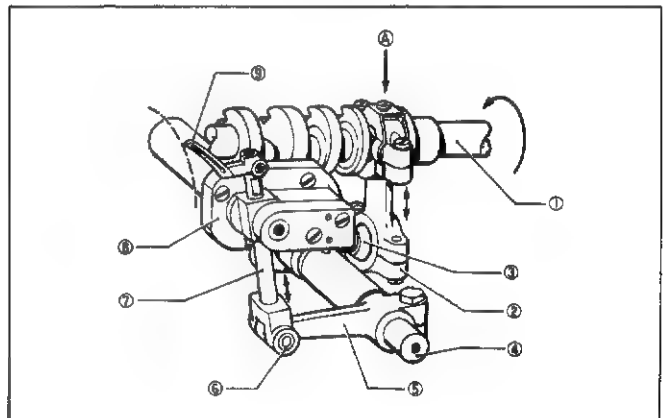
- In case that Crank Shaft ① may rotate to the direction indicated with arrow, with the eccentric portion ④ of Needle Arm Driving Crank Assembly of Crank Shaft, Needle Arm Driving Crank Assembly ② connected with Crank Shaft moves up and down.
- As the upper portion of Needle Arm Driving Crank Assembly is connected with Needle Arm Driving Lever ③ with its Pin ④, Needle Arm ⑤ gets the oscillating movement with the intermediate action of Needle Shaft ⑥.
- Needle Bar Connector ⑥ connected Needle Arm ⑤ with Needle Bar clamp ⑦ is fitted into the top of Needle Arm and gets sliding movement. This sliding movement plays a role to change the oscillating movement to linear movement of Needle Bar ⑧.
- Needle bar ⑧ that is held by needle bar connector ⑦ is guided by upper needle bar bushing ⑩, lower needle bar bushing ⑨, needle bar guide slide block ⑪ and needle bar guide ⑫.

2 UNDER LOOPER MECHANISM



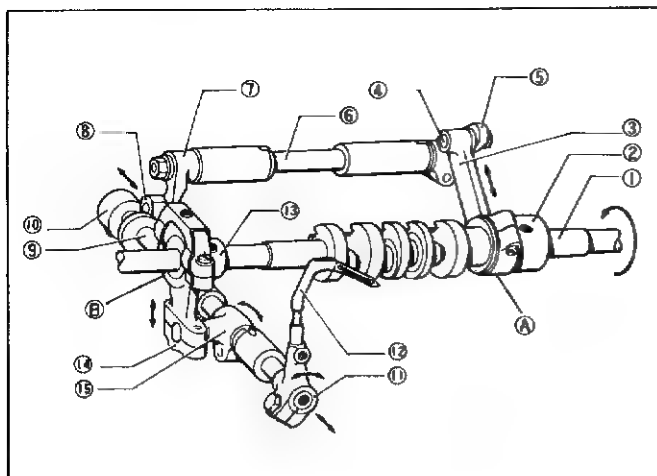
- In case that Crank Shaft ① may rotate to the direction indicated with arrow, with the eccentric portion ④ of Under Looper Connecting Rod of Crank Shaft, Under Looper Connecting Rod ② moves up and down.
- Under Looper ⑤ fitted into Under Looper Holder ③ gets the oscillating movement with the intermediate action of Under Looper Supporter ⑥ connected with Under Looper Connecting Rod ② and Under Looper Lever Shaft ⑦.

3 OVER LOOPER MECHANISM



- In case that Crank Shaft ① may rotate to the direction indicated with arrow, with the eccentric portion ④ of Over Looper Connecting Rod of Crank Shaft, Over Looper Connecting Rod ② moves up and down.
- Over Looper Driving Lever ⑤ gets the oscillating movement with the intermediate action of Over Looper Supporter ③ connected with Over Looper Connecting Rod ② and Over Looper Supporter Shaft ⑦.
- Its oscillation motion makes the overlooper describe an ideal orbit about overlooper holder ⑦ and overlooper guide assembly ⑧ via overlooper driving lever pin ⑥.

4. DOUBLE CHAIN STITCH LOOPER MECHANISM



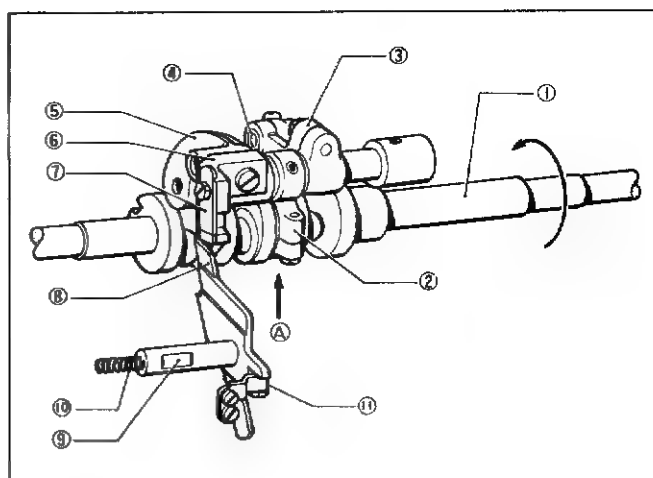
1) Double chain stitch looper back and forth movement mechanism

- In case that Crank Shaft ① may rotate to the direction indicated with arrow, by the eccentric portion ④ of Longitudinal Feed Lever Shaft for Chain Stitch of Crank Shaft, Longitudinal Feed Lever Shaft for Chain Stitch ② moves up and down in slant-wise.
- This movement carries to Longitudinal Feed Lever ③ with the intermediate action of Pin ④, Driving Lever ⑤ and Lever Shaft ⑥. Furthermore, it carries to Chain Stitch Looper ⑦ by the intermediate action of Slide Block ⑧ Feed Shaft ⑨ Feed Cam ⑩ and Chain Stitch Looper Holder ⑪.

2) Double chain stitch oscillating mechanism

- In case that Crank Shaft ① may rotate to the direction indicated with arrow, with the eccentric portion ③ of Chain Stitch Looper Connecting Rod of Crank Shaft, Chain Stitch Looper Connecting Rod ③ moves up and down.
- Its vertical motion is converted into an oscillating motion by oscillating lever ④ on longitudinal feed shaft ⑤ and the oscillation motion is conveyed to longitudinal feed shaft ⑥ double chain stitch looper holder ⑦ and double chain stitch looper ⑧.

5. KNIVES MECHANISM



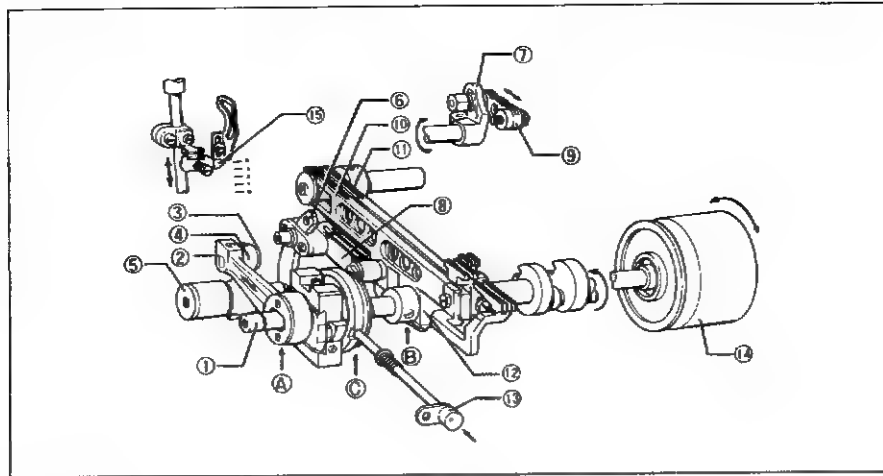
1) Upper knife mechanism

- In case that Crank Shaft may rotate to the direction indicated with arrow, with the eccentric portion ④ of Upper Knife Driving Rod of Crank Shaft, Upper Knife Driving Rod ② moves up and down.
- The top end of Upper Knife Driving Rod ② is connected with Upper Knife Driving Lever ③ with Pin ④, then Upper Knife Driving Lever ③ gets oscillating movement,
- Upper Knife ⑦ gets oscillating movement with the intermediate action of Upper Knife Driving Arm ⑥.

2) Lower Knife mechanism

- Lower Knife ④ is fixed with Lower Knife Holder ⑤ and being pushed to Upper Knife ⑦ with the pressure of Lower Knife Holder Spring ⑩ plays a role of edge trimming with Upper Knife ⑦. And Lower Knife Holder Guide plays roles of positioning of Lower Knife ④ and guide of Lower Knife Holder ⑤.

6 FEED MECHANISM AND STITCH LENGTH REGULATOR MECHANISM



1) Horizontal feed mechanism

- In case that Crank Shaft ① may rotate to the direction indicated with arrow, Eccentric Wheel Assembly rotates as well. Part ④ of Eccentric Wheel Assembly is fitted with Feed Rod ② and the end of Feed Rod is connected with Feed Arm ④ with Pin ⑤ thus Feed Arm ④ makes oscillating movement.
- This oscillating movement becomes horizontal movement of Main Feed Bar ⑦ and Differential Feed Bar ⑩ with the movements of Main Feed Link ⑨ and Differential Feed Link ⑧.
- Feed Arm ④ is fitted with Feed Shaft ③, so that Main Feed Arm ⑦ and Differential Feed Arm ⑥ get oscillating movements because these two arms are fitted with Feed Shaft ③.

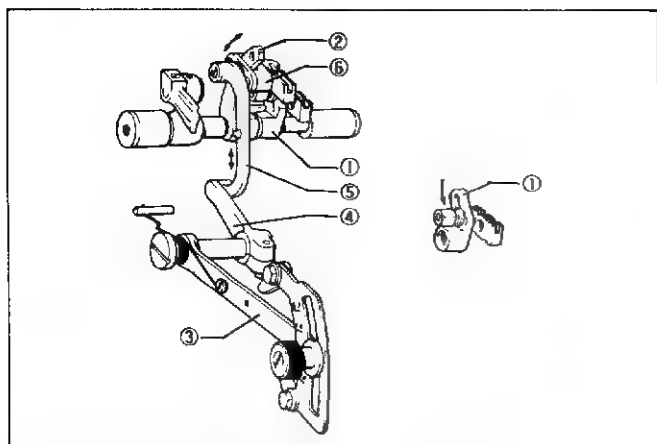
2) Vertical feed mechanism

- The part being fitted with Crank Shaft ① is eccentric, so that part ③ of Feed Lifting Slide Block ② Main Feed Arm ⑦ and Differential Feed Arm ⑥ get horizontal movements.
- Differential Feed Arm ⑥ is designed to slide the position to be able to adjust the amount of differential feeding. The detailed explanation on this mechanism is described hereinafter.
- Main Feed Arm ⑦ is designed to change the position to be able to adjust as illustrated, and this position is changed on the special specifications for gathering or shirring, and standard position is fixed at the highest position.

3) Stitch length regulator mechanism

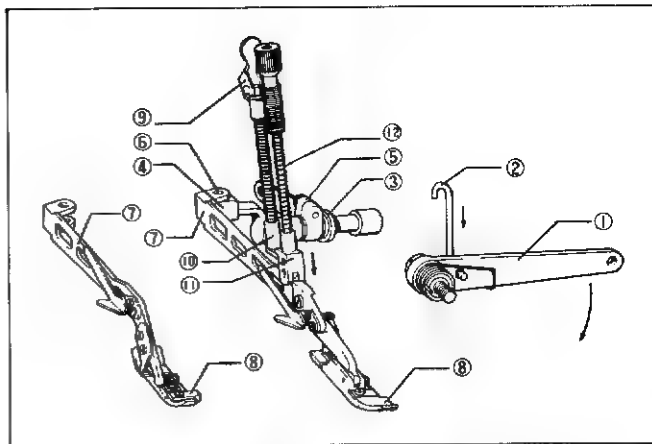
- Push Feed Adjusting Shaft ⑮ by thumb finger to Eccentric Wheel Adjusting Cam point ③ and turn Pulley ⑭ indicated arrow, and you will find the position that the end of Feed Adjusting Shaft ⑮ gets into the recess portion of Eccentric Wheel Adjusting Cam point ③.
Keeping that position with Feed Adjusting Shaft ⑮, turn Pulley ⑭ strongly, then match the line of Needle Thread Take Up Supporter ⑫ with figure on Face Plate. This procedure makes stitch length change to the desired number. This means that needle bar stroke is replaced to a part of crank shaft rotating angle, and it is determined the position of eccentric wheel assembly.

7 DIFFERENTIAL FEED MECHANISM



- The differential ratio can be adjusted by changing the height of differential feed arm ② relative to main feed arm ① height. A greater differential ratio can be obtained by changing the height of main feed arm ①.
- With movement of Differential Feed Adjusting Lever, Differential Feed Adjuster ⑥ is moved sliding on Differential Feed Arm ② with the intermediate action of Differential Feed Link Lever ④, and Differential Feed Adjusting Link ⑤.
- In case of shrink feed, lower differential adjusting lever ⑥.
In case of stretch feed, raise differential adjusting lever ⑥.

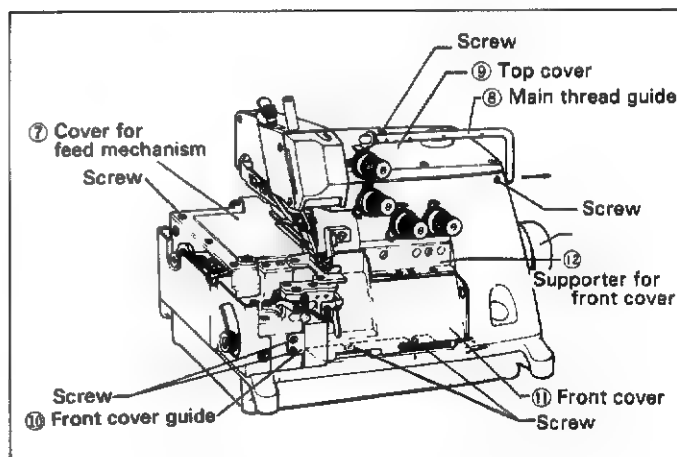
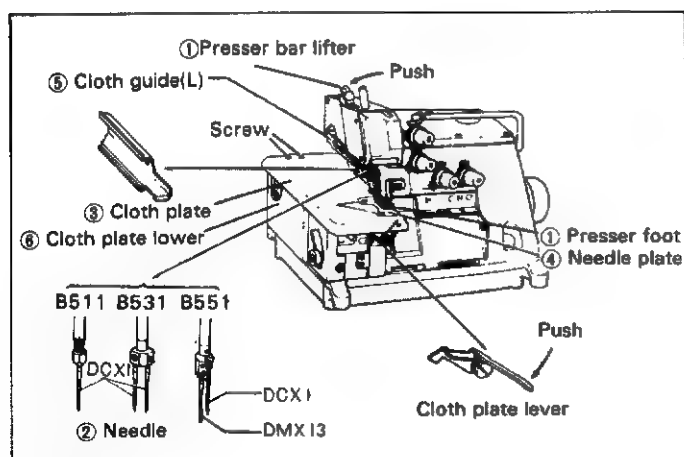
8 PRESSER FOOT MECHANISM



- In case that Presser Foot Lifter Lever ① is depressed down, Presser Foot Lifter Inside Lever ③ is lowered with the intermediate action of Presser Foot Lifter Ring ② connected in the hole of Presser Foot Lifter Lever ①. [Presser Foot Lifter Inside Lever is fixed with Presser Arm Shaft ④].
- In the near part of connected point between Presser Foot Lifter Inside Lever ③ and Presser Arm Shaft ④, there is boss on Presser Foot Lifter Inside Lever, and also boss on Set Collar ⑤. [Set collar ⑤ is connected with Presser Arm Shaft ④]. In case Presser Foot Lifter Inside Lever ③ is pulled down, by means of those bosses, Presser Foot Assembly ⑧ is lifted with the intermediate action of Presser Arm Shaft ④, Pin ⑥ and Main Presser Arm ⑦.
- If Presser Bar Lifter ⑨ is depressed down as per above figure, Presser Bar Lifting Shaft ⑩ is lifted up and its edge brings Presser Bar ⑪, thus Main Presser Arm ⑦ is released from the pressure of Presser Bar Spring ⑫.

DISASSEMBLING PROCEDURES

1 COVER MECHANISM



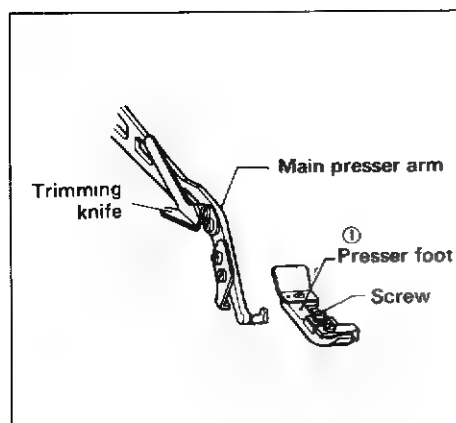
Procedures

- | | Q'ty of screw |
|---|---------------|
| ① Turn out presser foot above needle plate. | |
| ② Remove needles. | |
| ③ Remove cloth plate. | 2 |
| ④ Remove needle plate. | 2 |
| ⑤ Remove cloth guide (L). | 2 |
| ⑥ Remove cloth plate lower. | 3 |

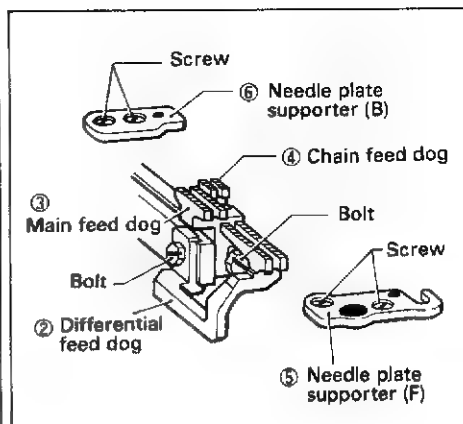
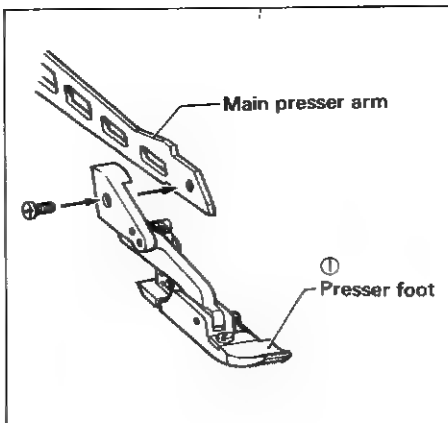
- | | Q'ty of screw |
|-------------------------------------|---------------|
| ⑦ Remove cover for feed mechanism. | 5 |
| ⑧ Remove main thread guide. | 1 |
| ⑨ Remove top cover. | 6 |
| ⑩ Remove front cover guide. | 2 |
| ⑪ Remove front cover. | 2 |
| ⑫ Remove supporter for front cover. | 2 |

2 FEED AND PRESSER FOOT MECHANISM

(B511,531)



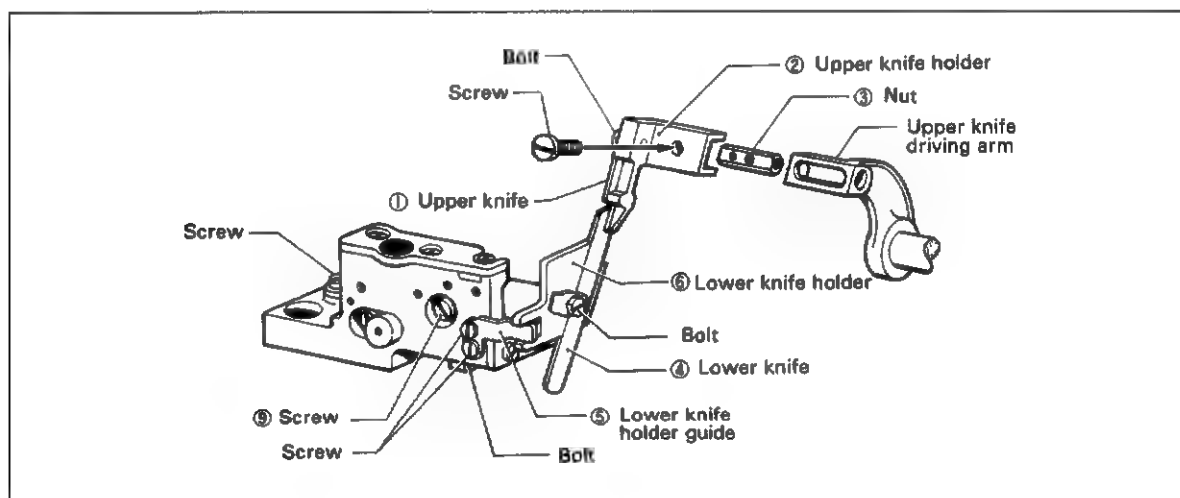
(B551)



Procedures

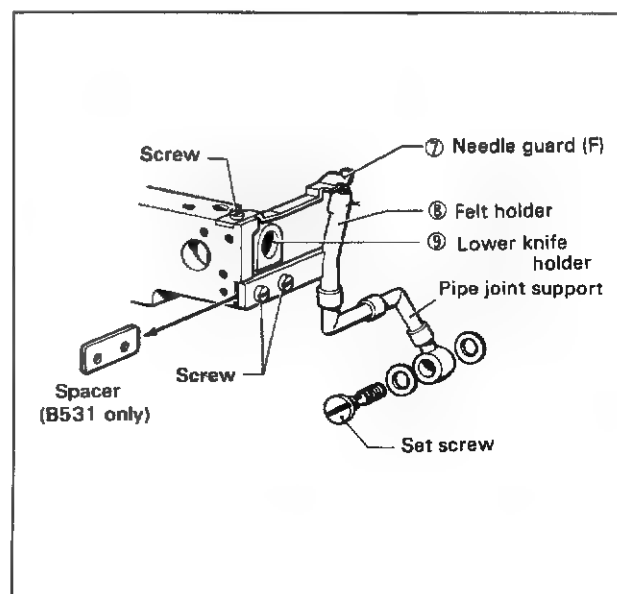
	Q'ty of screw		Q'ty of screw
① Remove presser foot.	1	④ Remove chain feed dog.	2
② Remove differential feed dog.	1	⑤ Remove needle plate supporter (F)	2
③ Remove main feed dog.	1	⑥ Remove needle plate supporter (B)	2

3 KNIVES MECHANISM

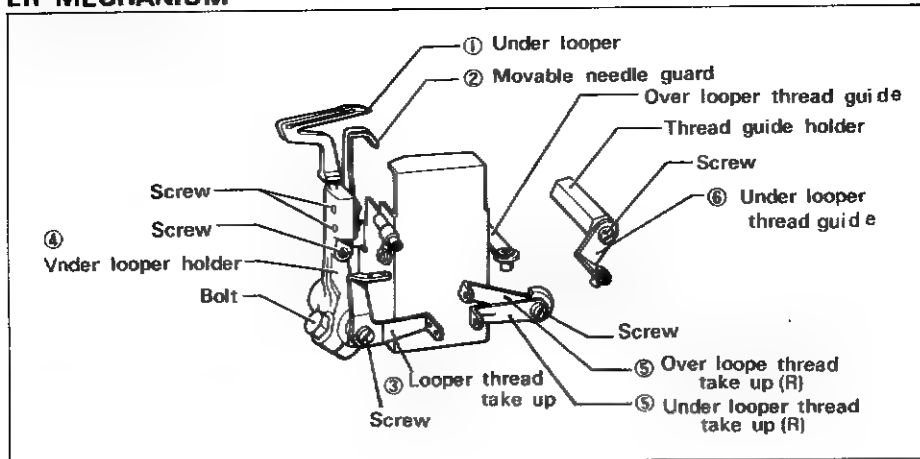


Procedures

- ① Turn upper knife holder to the right direction and remove upper knife.
- ② Remove upper knife holder.
- ③ Remove nut for upper knife holder.
- ④ Remove lower knife.
- ⑤ Remove lower knife holder guide.
- ⑥ Remove lower knife holder.
(Pull out spring for lower knife holder also.)
- ⑦ Remove needle guard (F).
- ⑧ Remove felt holder.
- [B531]** For B531 only, spacer for felt holder is Removable.
- ⑨ Remove lower knife holder supporter.
- [B551]** For B551 only, Remove needle guard (B) before hand.
(Refer to Page 12, 6-2)



④ UNDER LOOPER MECHANISM



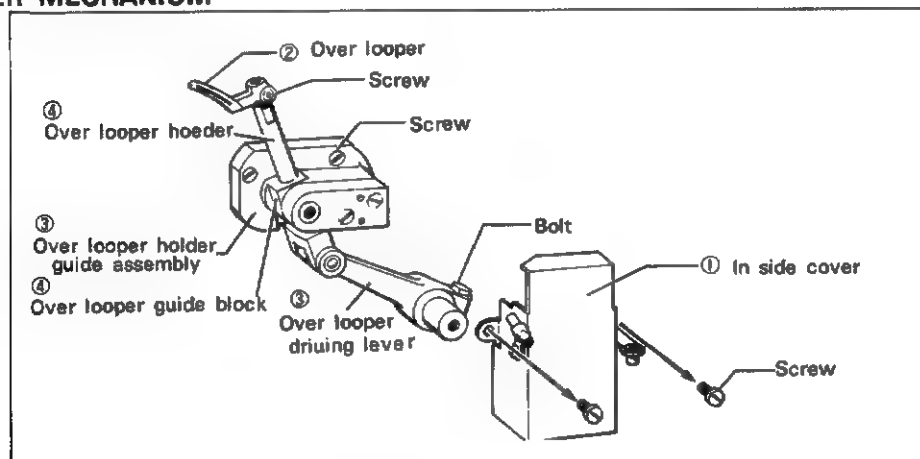
Procedures

- ① Remove under looper.
- [B551] For B551 only, remove movable needle guard beforehand.
- ② Remove movable needle guard.
- ③ Remove looper thread take up (L).
- ④ Remove Under looper holder.
- ⑤ Remove over looper and under looper thread take up (R).
- ⑥ Remove under looper thread guide.

Q'ty of screw

1
2
1
1
1
1

⑤ OVER LOOPER MECHANISM



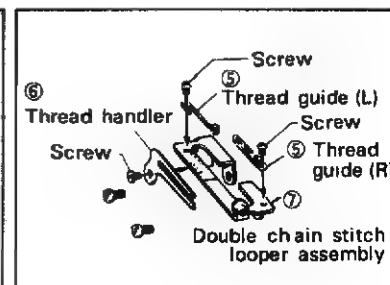
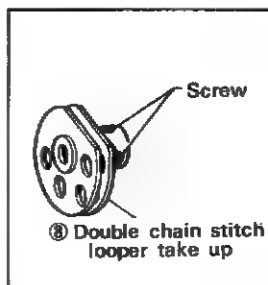
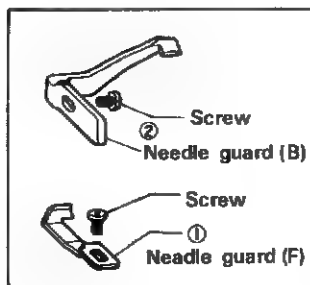
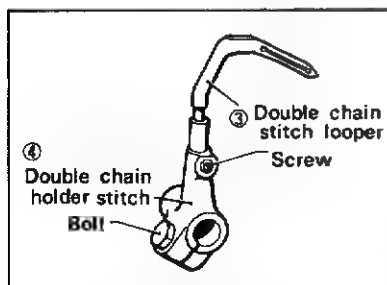
Procedures

- ① Remove inside cover.
(Set over looper to the left mostly)
- ② Remove over looper.
- ③ Remove over looper driving lever and over looper holder guide assembly at the same time.
- ④ Pull over looper holder out of over looper guide block

Q'ty of screw

2
1
1-3

⑥ DOUBLE CHAIN STITCH LOOPER MECHANISM



Procedures

- ① Remove needle guard (F)
- ② Remove needle guard (B)
- ③ Remove double chain stitch looper.
- ④ Remove double chain stitch looper holder.
- ⑤ Remove thread guide (R) and (L)

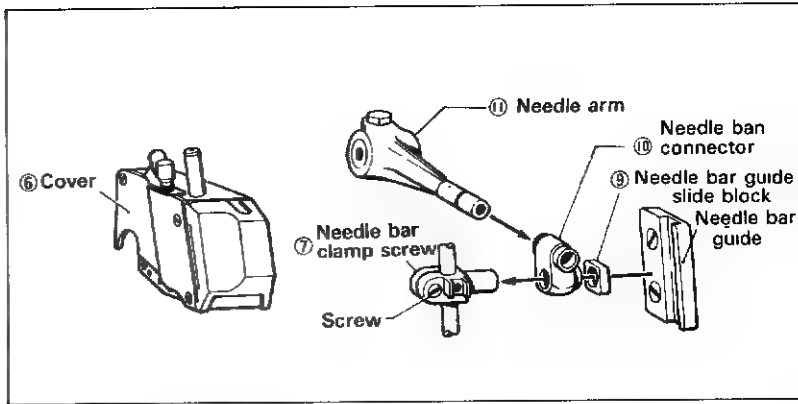
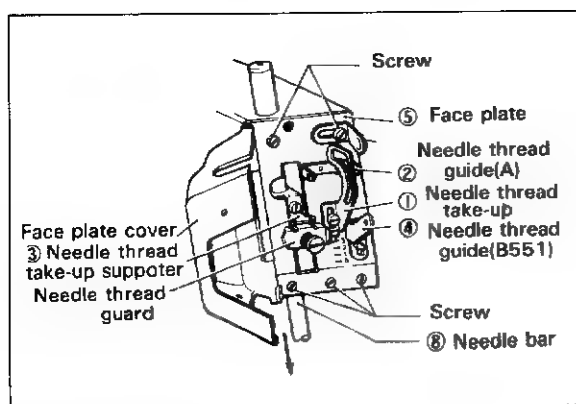
Q'ty of screw

1
1
1
1
1

- ⑥ Remove thread handler.
- ⑦ Remove double chain stitch looper base assembly
(Put screw driver into the hole of double chain stitch looper take up and loosen set screw)
- ⑧ Remove double chain stitch looper take up.

Q'ty of screw

1
2
2



Procedures

- ① Remove needle thread take-up.
- ② Remove needle thread guide (A).
- ③ Remove needle thread take-up supporter.
- ④ Remove needle thread guide (B551).
- ⑤ Remove face plate.

Q'ty of screw

1
1
1
1
5

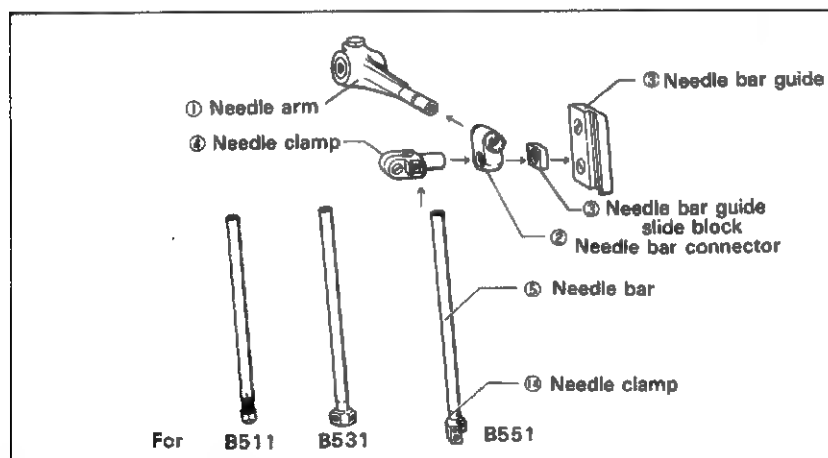
Procedures

- ⑥ Remove cover.
- ⑦ Loosen needle bar clamp screw.
- ⑧ Remove needle bar.
- ⑨ Remove needle bar guide slide block.
- ⑩ Remove needle bar connector.
- ⑪ Remove needle arm.

Q'ty of screw

6
1
1
1
1
1

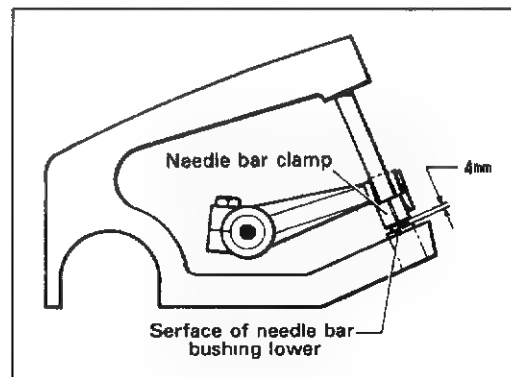
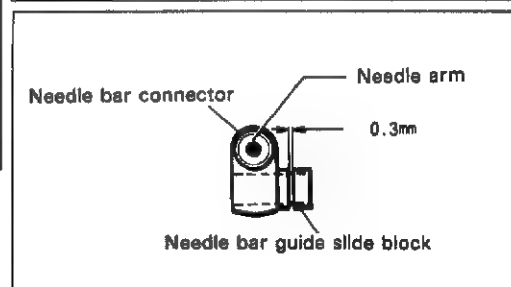
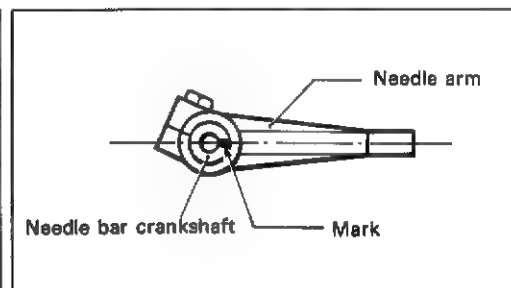
6. ASSEMBLING ADJUSTMENT PROCEDURES



Procedures

Q'ty of screw

- ① Temporarily fasten the needle arm on the needle bar crankshaft.
*Align the center of the needle arm with the mark on the needle bar crankshaft.
- ② Fit the needle bar connector onto the needle arm.
- ③ Fit the needle bar guide slide block into the needle bar guide.
- ④ Insert the shaft end of the needle bar clamp into the needle bar guide slide block.
- ⑤ Turn the pulley until the needle bar clamp is raised to the highest position, and then insert the needle bar into the needle bar clamp.
Temporarily fasten the needle bar at a height where the needle clamp is barely hidden in the frame.
- ⑥ Adjust the needle arm so there is a clearance of about 0.3mm between the needle bar connector and the needle bar guide slide block. (Horizontal adjustment)
- ⑦ Adjust the needle arm so there is a clearance of 4mm between the needle bar clamp and the top of the lower needle bar bushing when the needle bar is down lowest. (Vertical adjustment)



Procedures

Q'ty of screw

- ⑧ Fasten the side cover on the frame with 6 screws.
*Clean the side cover and the frame, apply an adhesive like Three Bond No. 4, make sure that all four corners are properly positioned, and then fasten the cover.
- ⑨ Fasten the face plate on the frame with 5 screws.
*Fasten the face plate cover stop leaf springs at the same time, and fasten the face plate cover where it can be easily opened and closed and fixed.
- ⑩ Fasten the needle thread take up supporter assembly to the needle bar clamp with a screw.
- ⑪ Fasten the needle thread guide A to the face plate with a screw.
- ⑫ Fasten the needle thread take up to the needle thread take up supporter assembly with a screw.
 - Normally, it should be fastened in the center of its adjustable range.
 - Lower its position to increase the needle thread tension.
 - Raise its position to decrease the needle thread tension.

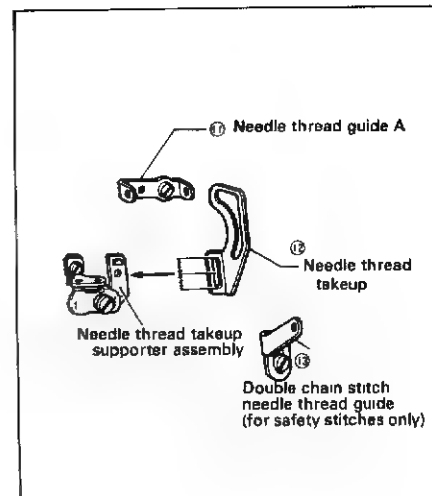
6

5

1

1

1



- Safety Stitch** ⑬ Fasten the double chain stitch needle thread guide to the face plate with a screw.
- Normally, it should be fastened in the center of its adjustable range.
 - Raise its position if the needle thread winds itself around the looper.
 - Also raise its position to increase the needle thread tension.
 - Lower its position to decrease the needle thread tension.

- ⑭ Fasten the needle to the needle clamp.
*Adjust the needle bar height after installing the underlooper. (See Step ⑤ on Page 14 for the underlooper.)
- ⑮ Temporarily fasten the main and differential feed dogs.
- ⑯ Temporarily fasten the front and rear needle plate supports on the needle plate support bracket with two screws each.
- ⑰ Temporarily fasten the needle plate on the front and rear needle plate supports with two screws.
- ⑱ Lower the needle slightly into the needle plate and adjust it so the needle will be in the center of the needle plate slot. (Sidewise adjustment) For adjusting the needle's longitudinal position, move the front and rear needle plate supports until the distance between the needle center and the needle plate is 1.5mm (or 1.8mm in the case of B531).

Twin Needles Use the left needle as reference when sewing twin-needle overlock stitches. (See Page 30 for tilt.)

Safety Stitch Use the hemming needle as reference when sewing safety stitches. Adjust the double chain stitch needle by turning the needle bar.

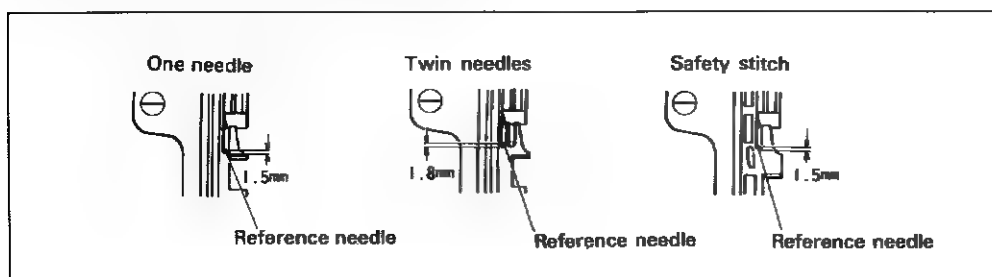
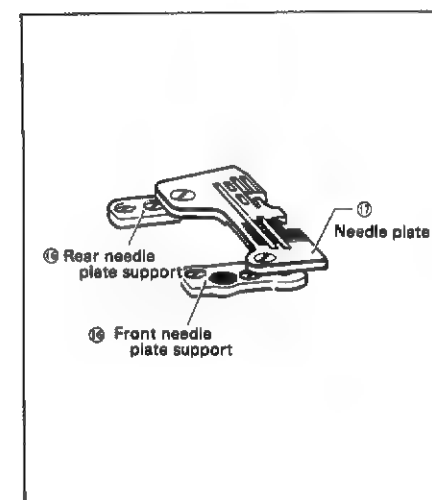
- ⑲ Temporarily tighten the needle bar clamp with a screw.
- ⑳ Fasten the front and rear needle plate supports and the needle plate securely with two screws each.
- ㉑ Remove the main and differential feed dogs and the needle plate.

2

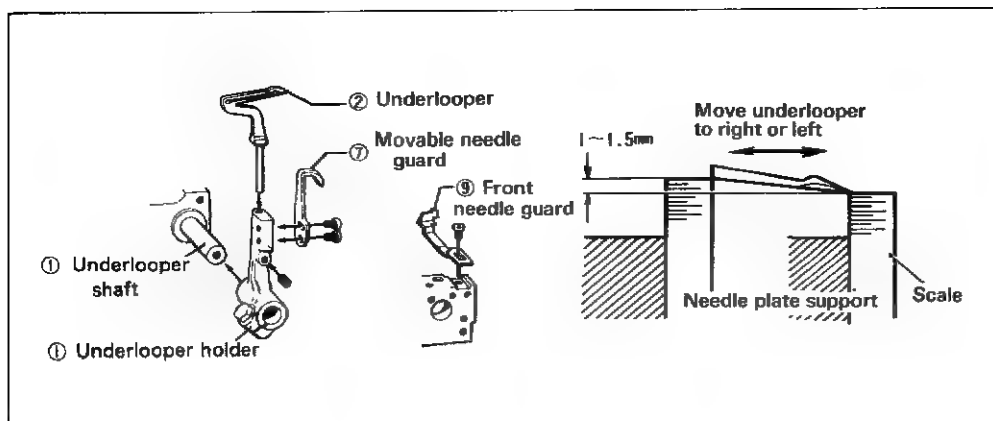
2

1

2



2 UNDERLOOPER



Procedures

- ① Temporarily fasten the underlooper holder on the underlooper shaft with a bolt.
- ② Insert the underlooper all the way into the underlooper holder.
- ③ Measure the underlooper tilt at its point and bottom, adjust it until the measurement difference is in the range of 1 to 1.5mm, and then fasten the underlooper with a screw.
- ④ The underlooper must be so positioned that, when the needle rises 4.1mm (standard specifications) or 2.6mm (high-lift specifications) from the lowest position, the underlooper point is in line with the needle center. (Sidewise positioning)
- ⑤ After Step ④, move the needle bar up or down until the distance between the top end of the needle eye and the underlooper point is 1.5mm (standard specifications) or 2mm (high-lift specifications), and temporarily tighten the needle bar clamp.
- ⑥ Position the underlooper so that, when the underlooper point is in line with the needle center on the needle's upward travel, the underlooper point hits the needle by about 0.05 to 0.1mm deep, and then fasten the underlooper holder. (Longitudinal positioning)
 ※ 0.05 to 0.07mm for cotton fabrics; 0.08 to 0.1mm for chemical fabrics.

Twin Needles In case of twin-needle sewing, loosen the needle bar clamp screw, turn the needle bar until the underlooper point hits both needles by approximately the same depth or the right needle slightly deeper, and fasten the needle bar. (See the figure at right.)

- ⑦ Temporarily fasten the movable needle guard to the underlooper holder with two screws.
- ⑧ Match the underlooper point with the needle center on the needle's upward travel, move the movable needle guard until it contacts the needle, adjust the clearance between the underlooper point and the needle to 0 to 0.05mm, and fasten the movable needle guard.
 ※ 0.02 to 0.05mm for cotton fabrics; 0 to 0.03mm for chemical fabrics.
- ⑨ Temporarily fasten the front needle guard to the needle plate support bracket with a screw.
- ⑩ Under the condition specified in Step ⑧, adjust the clearance between the needle and the front needle guard to 0.3 to 0.5mm.

Safety Stitch Omit Steps ⑨ and ⑩ when sewing safety stitches.

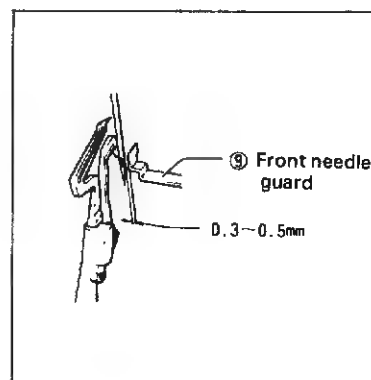
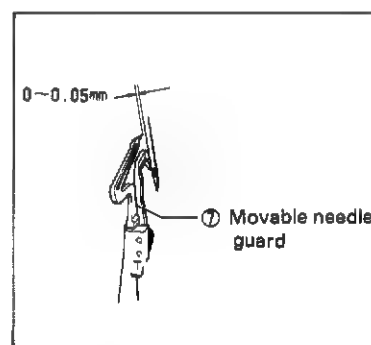
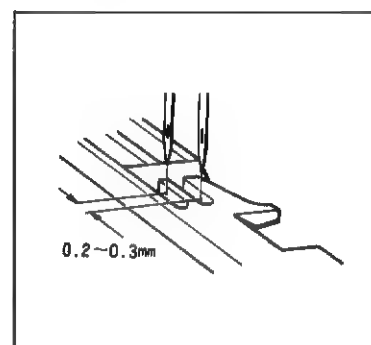
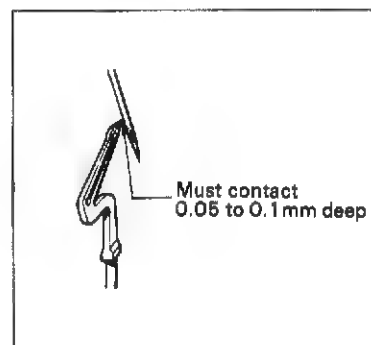
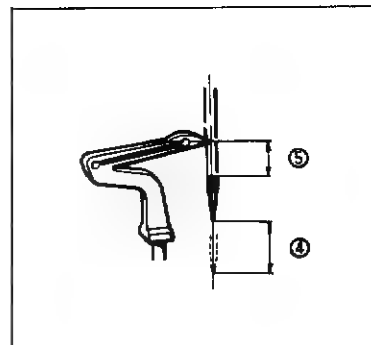
Q'ty of screw

1

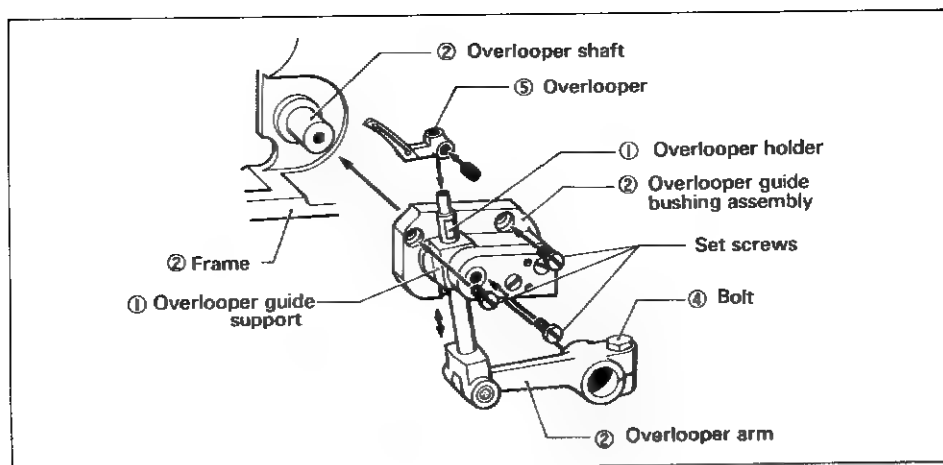
1

2

1



3 OVERLOOPER



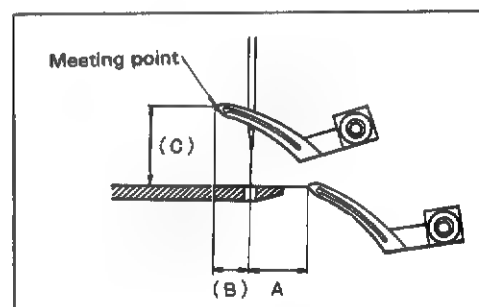
*Overlooper holder assembly (Overlooper holder and overlooper arm)

Procedures

Q'ty of screw

- ① Insert the overlooper holder into the overlooper guide support.
- ② Fit the overlooper guide bushing assembly onto the frame and the overlooper arm onto the overlooper shaft at the same time.
- ③ Temporarily fasten the overlooper guide bushing assembly with three screws. 3
- ④ Move the overlooper arm up or down until there is the least resistance so the overlooper arm 1 is in alignment with the overlooper shaft, and then temporarily fasten it with a screw.
- ⑤ Insert the overlooper all the way into the overlooper holder, and temporarily fasten it with a screw. 1

- A: Distance between overlooper point and needle center when overlooper point is at needle plate top.
- B: Distance between overlooper point and needle center when overlooper is at left extremity.
- C: Distance between overlooper point and needle plate top when overlooper is at left extremity.



- ⑥ Select the correct distance A from the table below according to your machine specifications, make an adjustment by moving the overlooper guide bushing assembly ②, shown in the above figure, to the right or left, and fasten it securely.

High-lift Specifications

- * When changing your machine from the standard specifications to the high-lift specifications, replace the overlooper and the overlooper holder assembly, and make an adjustment.

Spec	Single needle		Twin needles (four threads)		Twin needles (mock safety)		Safety stitch	
	Standard	High-lift	Standard	High-lift	Standard	High-lift	Standard	High-lift
Distance A	7.2	8.2	7.2	8.2	7.2	8.2	7.2	8.2
B	(5.6)	(5)	(5.6)	(5)	(5.6)	(5)	(5)	(5)
C	(11.2)	(11.8)	(11.2)	(11.8)	(11.2)	(11.8)	(10.5)	(11.8)

* B and C figures are for reference.

(In millimeters)

- ⑦ Loosen bolt ④ shown in the figure on Page 15, move the overlooper arm up or down so that, when the overlooper meets the underlooper, the overlooper point will have a clearance of about 0.1mm under the hump of the underlooper, and then retighten the bolt.

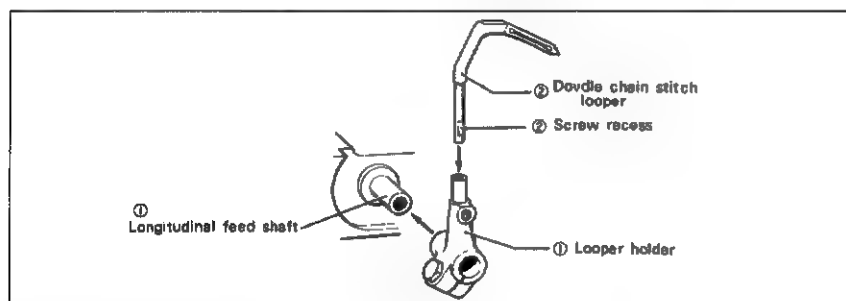
Single needle (two threads) A hoop looper for twothread stitches is available. Its meeting distance is the same as that of the overlooper.

Twin needles (mock safety) Replace the overlooper with the mock safety stitch overlooper, and adjust so the outer needle will be on the right of the overlooper slot center.

※ If there is a clearance of more than 0.1mm in Direction ① in the figure at right, stitches may skip due to the failure of catching loops. Even if there is a clearance of 0.1 to 1mm in Direction ②, loops can be picked up, but there is a less clearance between the needle and the overlooper.

- ⑧ Fasten the inner cover on the frame with two screws.
⑨ Fasten the front cover support assembly on the frame with two screws.

4 DOUBLE CHAIN STITCH LOOPER MECHANISM

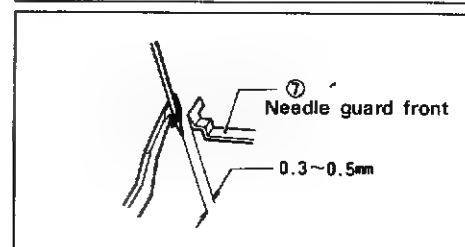
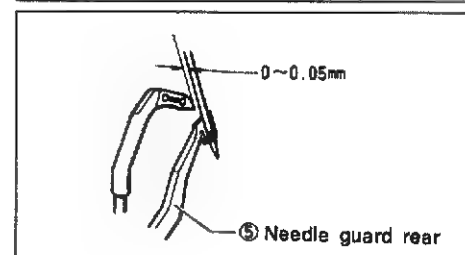
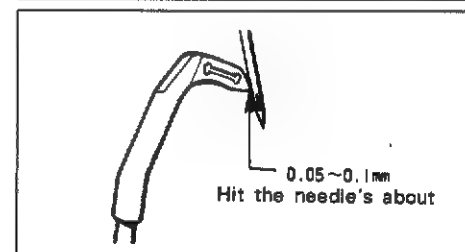
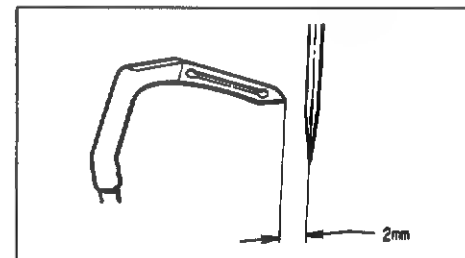
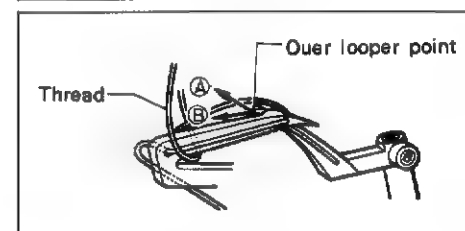
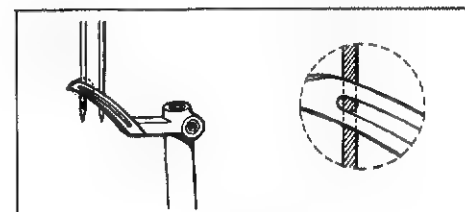
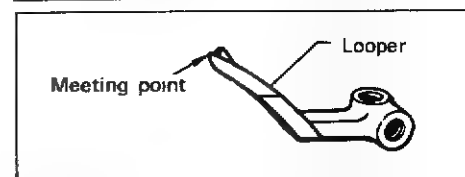
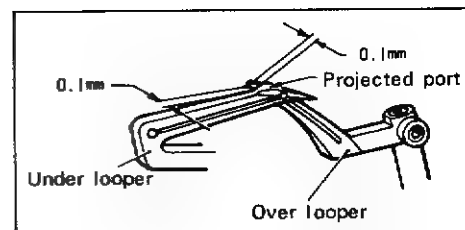


Procedures

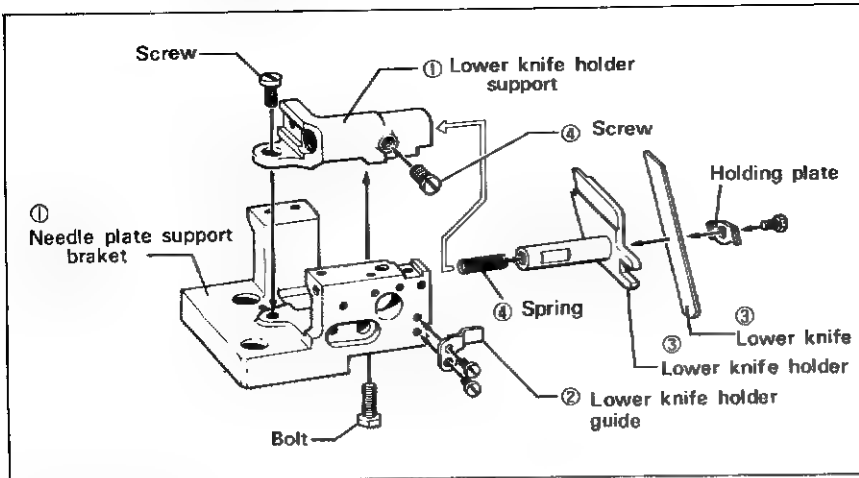
- ① Temporarily fasten the double chain stitch looper holder on the longitudinal feed shaft with a screw.
- ② Install the double-chain stitch looper by inserting it all the way into the double-chain stitch looper holder. The inclination of the looper depends on the screw recess.
- ③ Make an adjustment so that the distance between the looper point and the center of the needle is 2mm when the double-chain stitch looper comes to the leftmost position.
- ④ Position the looper so that, when the looper point is in line with the needle center on the needle's upward travel, the looper point will hit the needle about 0.05 to 0.1mm deep, and then fasten the double chain stitch looper holder. (Longitudinal positioning)

※ Subsequent adjustments should be made after knife adjustments.

- ⑤ Temporarily fasten the rear needle guard on the lower knife holder support with a screw.
- ⑥ Match the looper point with the needle center on the needle's upward travel, hold the rear needle guard in contact with the needle, adjust the clearance between the looper point and the needle to 0 to 0.05mm, and fasten the rear needle guard securely.
- ⑦ Temporarily fasten the front needle guard on the needle plate support bracket with a screw.
- ⑧ Under the condition specified in Step ⑥, adjust the clearance between the needle and the front needle guard to 0.3 to 0.5mm, and fasten the front needle guard securely.



5 KNIVES MECHANISM

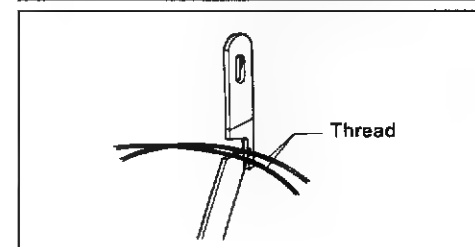
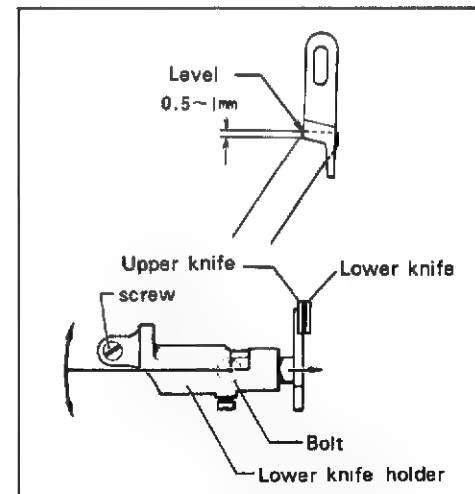
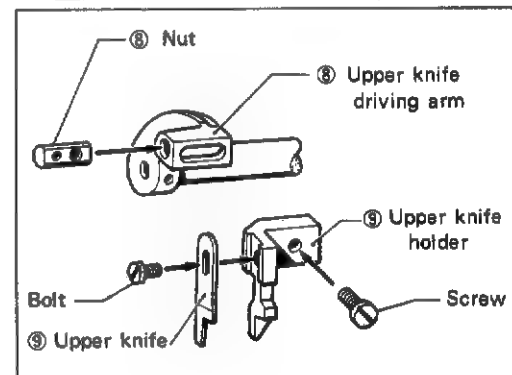
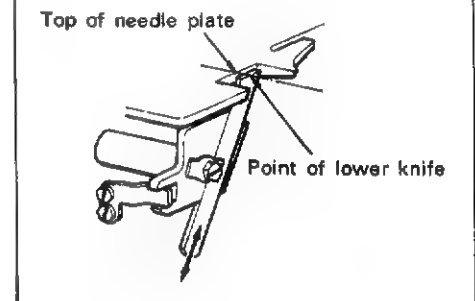
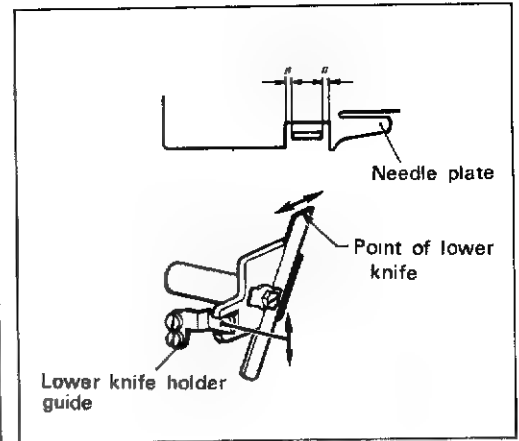
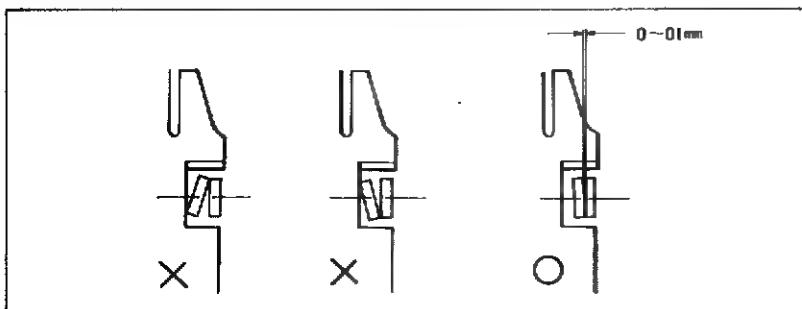


Procedures

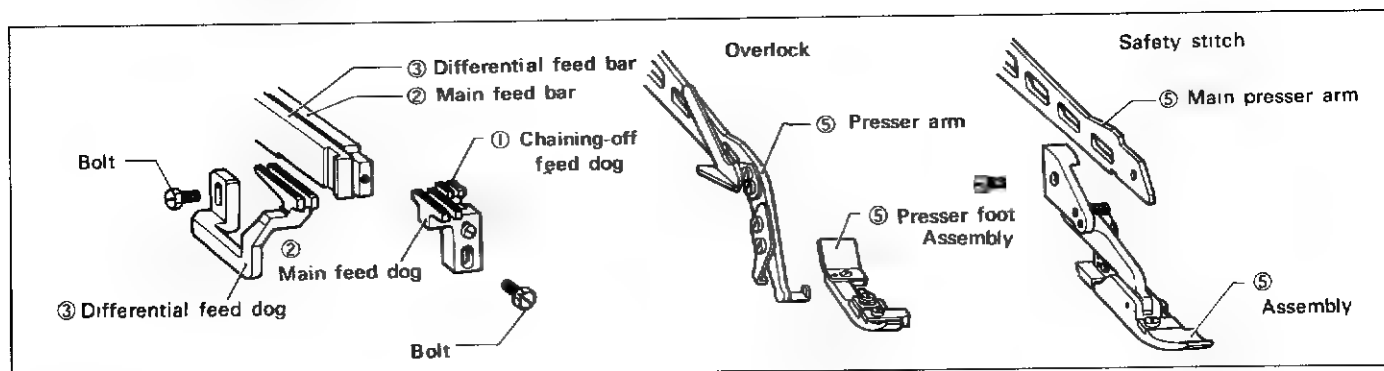
- ① Temporarily fasten the lower knife holder support on the needle plate support bracket with two screws.
- ② Temporarily fasten the lower knife holder guide on the needle plate support bracket with two screws.
- ③ Temporarily fasten the lower knife on the lower knife holder with a screw.

Safety Stitch

- ④ Temporarily fasten the rear needle guard.
- ⑤ Insert the spring into the lower knife holder, fit the lower knife holder into the lower knife holder support, and tighten the lower knife holder set screw just tight enough to keep it from sliding out (but not securely).
- ⑥ Raise or lower the tip of the lower knife holder guide so the lower knife will be longitudinally equi-distant in the needle plate slot for the lower knife, and temporarily fasten it. (Angle adjustment)
- ⑦ Raise or lower the lower knife until the top of the lower knife is level with the needle plate top, and fasten the lower knife securely. (Height adjustment)
- ⑧ Remove the needle.
- ⑨ Fit the upper knife holder nut on the upper knife driving arm.
- ⑩ Temporarily tighten the upper knife in the upper knife holder. (Push the lower knife holder.)
- ⑪ Temporarily tighten the upper knife holder on the upper knife driving arm.
- ⑫ Lower the upper knife all the way, and adjust so that the upper knife will engage the lower knife 0.5~1mm deep.
- ⑬ When the upper and lower knives are engaged, adjust the angle of the lower knife so that the lower left angle of the upper knife will match the upper left angle of the lower knife (as indicated by ⑥ in the preceding page), and fix it securely.
- ⑭ For adjusting the engagement of the upper and lower knife, loosen the screw and bolt which fasten the lower knife holder, turn the lower knife holder about the bolt until there is a clearance corresponding to the thickness of a sheet of tissue paper, then retighten the screw and bolt.
- ⑮ Loosen the lower knife holder screw to allow the lower knife to be pressed against the upper knife by spring pressure, lower the upper knife to its lowest position, and retighten the lower knife holder screw.
- ⑯ Place the thread between the upper and lower knives in the fore and rear parts, and see that the thread can be sharply cut.



6 FEED DOG · PRESSER FOOT MECHANISM



Procedures

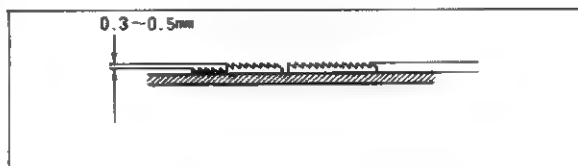
- ① Adjust chaining-off feed dog to a height of 0.3~0.5mm below the main feed dog.
- ② Temporarily fasten the main feed dog on the main feed bar with a screw.
- ③ Temporarily fasten the differential feed dog on the differential feed bar with a screw.
- ④ Turn the pulley until the feed dogs are raised to the highest position, and adjust them to the following height above the top of the needle plate.
 - 1.0mm for thin materials
 - 1.3mm for medium-thick materials
 - 1.5mm for thick materials

Q'ty of screw

1

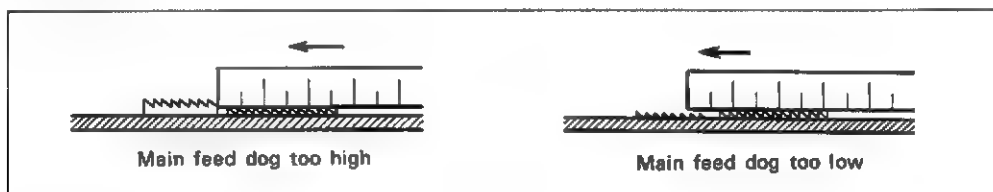
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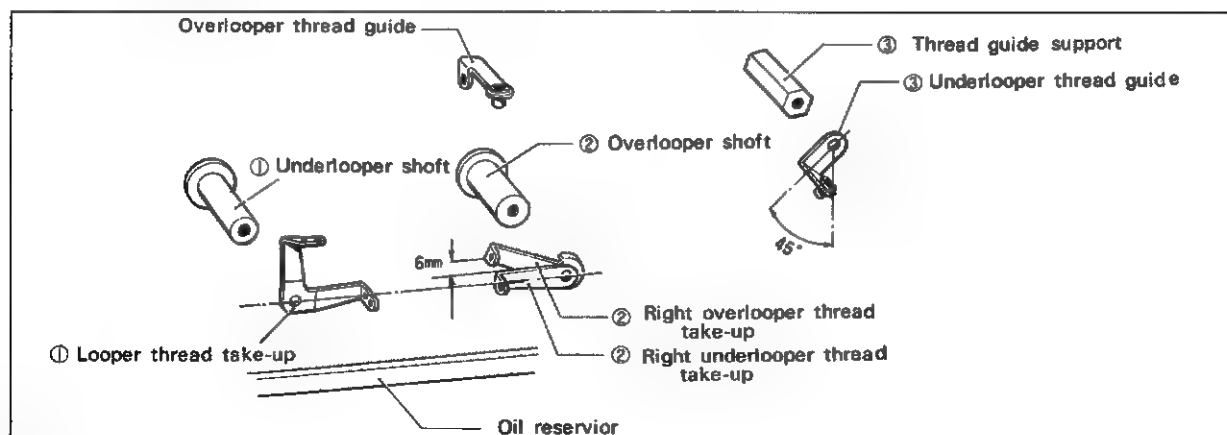
Safety Stitch

Note: When sewing safety stitches, make sure that the main and differential feed dogs are level with each other. Otherwise, safety stitches cannot be sewn. Use a scale as shown below to check their levelness.



- ⑤ Fasten the presser foot assembly on the presser arm with a screw.

7 LOOPER THREAD TAKE-UP · THREADGUIDE MECHANISM



Procedures

- ① Fasten the looper thread take-up on the underlooper shaft with a screw.
 - ② Fasten the right overlooper-underlooper thread take-up on the overlooper shaft with a screw.
 - ③ Fasten the underlooper thread guide on the underlooper guide support with a screw.
 - ④ Adjust each thread take-up and thread guide to their standard positions as shown above after raising the needle up highest.
- * When the right looper thread take-up is raised, less thread will be delivered. When it is lowered, more thread will be delivered. When the underlooper thread guide is moved to the right, less thread will be delivered. When it is moved leftward, more thread will be delivered.

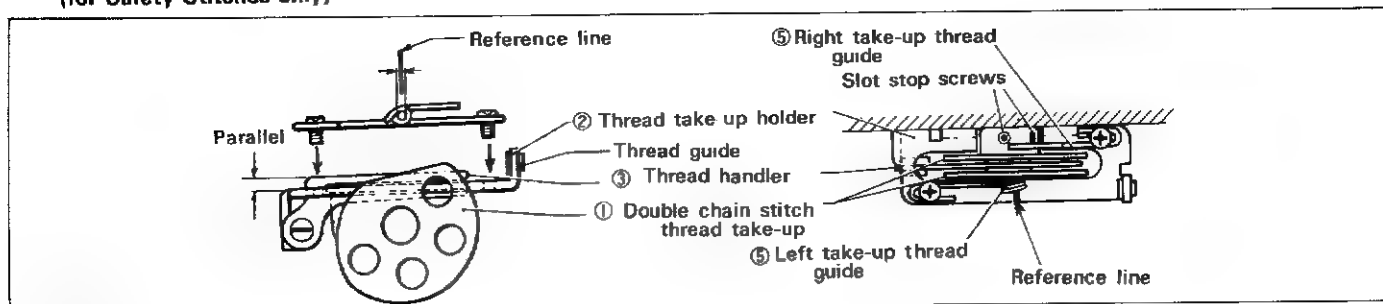
Q'ty of screw

1

1

1

8 DOUBLE CHAIN STITCH LOOPER THREAD TAKE-UP AND THREAD GUIDE MECHANISM (for Safety Stitches only)

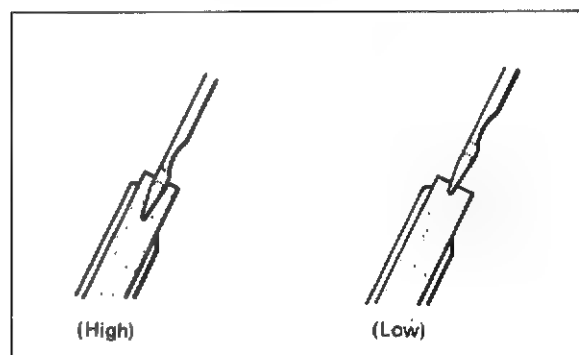
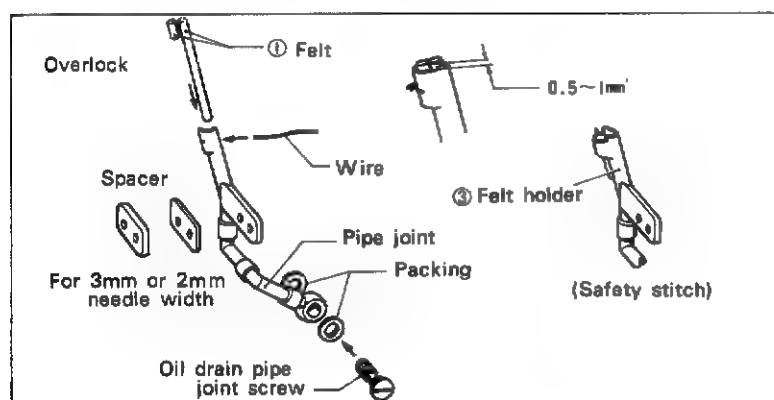


Procedures

Q'ty of screw

- ① Temporarily fasten the double chain stitch thread take-up on the drive shaft with two screws. 2
 - ② Fasten the thread take-up holder on the frame with two screws. 2
 - ③ Fasten the thread handler on the thread take-up holder parallel to it, using a screw. 1
 - ④ Fasten the double chain stitch thread take-up with a screw at a point where the thread handler is in the center of the slot. 1
 - ⑤ Fasten the right and left thread guide with one screw each, making sure that they are equi-distant from the reference line on the thread take-up holder in the thread slot. 1
 - ⑥ Adjust the timing so that, when the needle is up highest, the double chain stitch thread take-up will pull back the looper thread. (The height of the double chain stitch thread take-up from the thread take-up holder will be about 6mm.)
- ※ When the double chain stitch thread take-up is advanced (counterclockwise), the looper thread tension increases; and when it is moved back (clockwise), the looper thread tension decreases.

9 NEEDLE COOLER MECHANISM



Procedures

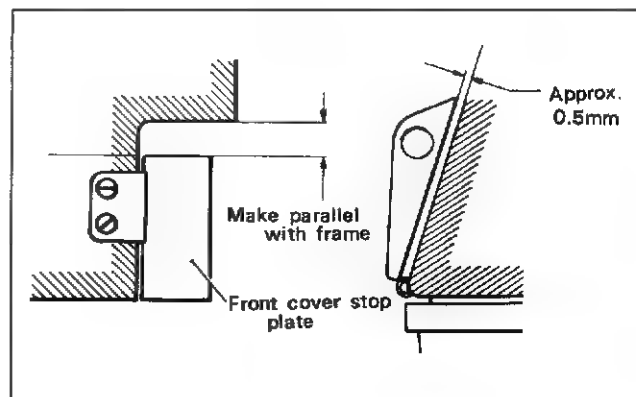
Q'ty of screw

- ① Remove the lower knife by loosening the screw. 1
 - ② Insert the felt into the felt holder until its top is about 0.5 to 1mm out.
 - ③ Insert the wire into the felt holder hole to secure the felt in place.
 - ④ Fasten the felt holder on the needle plate support bracket with two screws. 2
- ※ In case of twin-needle overlock stitches, place spacers between the frame and felt holder.
- ⑤ The felt holder must be carefully positioned as cautioned in the right figure above.
- If it is too high, the movable needle guard will hit the felt holder.
- If it is too low, the needle will not be cooled.

10 FRONT COVER MECHANISM

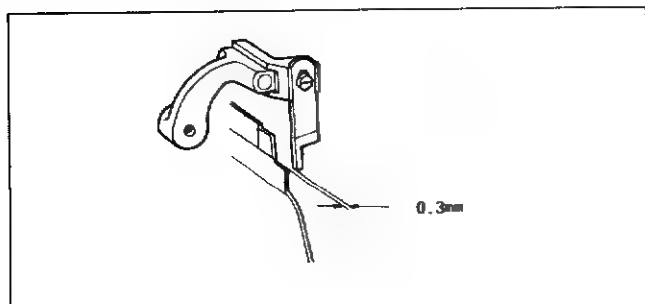
Procedures

- ① Temporarily fasten the front cover assembly on the frame.
 - ② Temporarily fasten the front cover stop plate parallel to the frame.
- ※ Make an adjustment so that, when the front cover comes off the front cover stop plate, it can be put back in place as before.
- ※ The following adjustments must be made while checking.
- ③ Adjust the front cover so it is parallel to the frame and has a clearance of about 0.5mm.

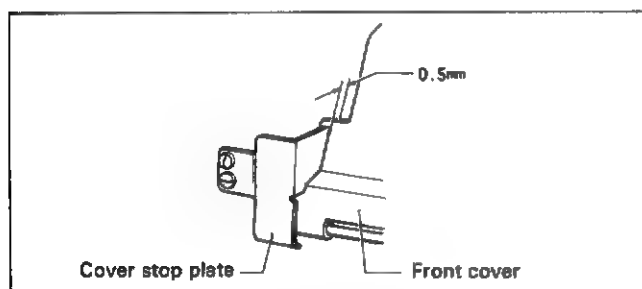


Overlock Stitch

- ④ Make an adjustment so that, when the upper knife is down lowest, there is a clearance of about 0.3mm between the front cover and the upper knife.

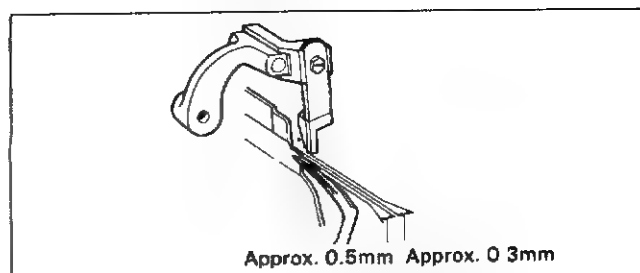


- ⑤ Adjust the clearance between the front cover and the front cover stop plate to 0.5 to 1mm.

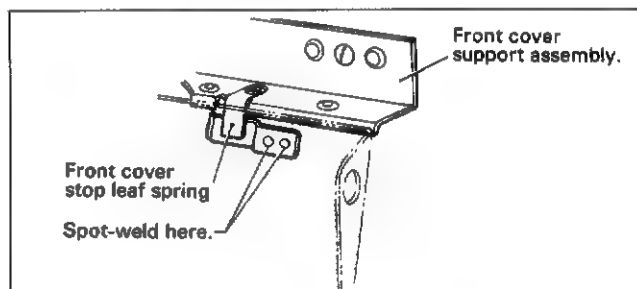


Safety Stitch

- ④ When sewing safety stitches, make an adjustment so that the front cover will be between the upper knife and the double chain stitch looper and their clearance will be as shown below.



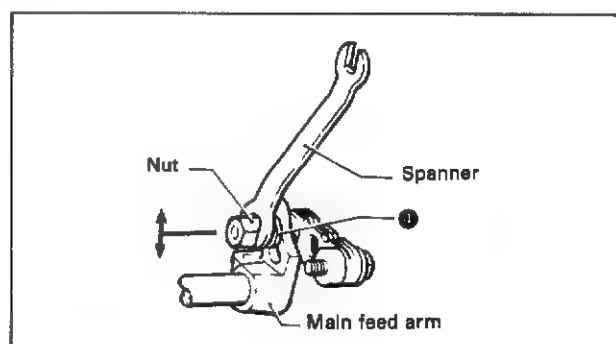
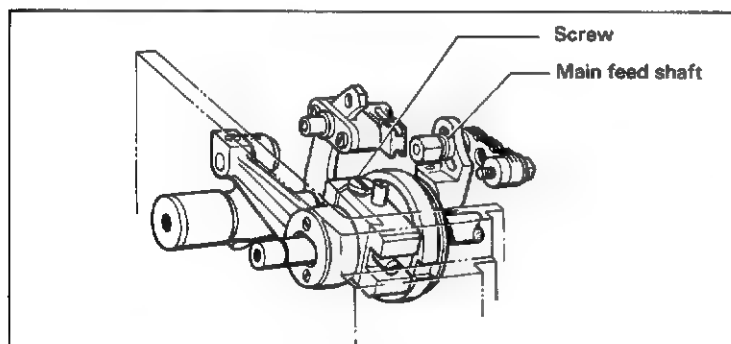
- ⑥ The front cover is held securely by the front cover support and front cover stop leaf spring.



7. DIFFERENTIAL RATIO ADJUSTMENTS

To greatly change the differential ratio, adjust the eccentric wheel and raise or lower the main feed shaft.

- (1) To change the differential ratio, loosen the nut and raise or lower the main feed shaft.



- Main feed shaft position vs. differential ratio is as shown below.

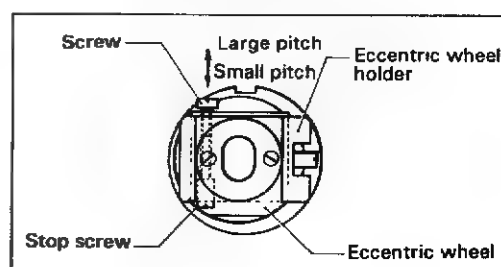
• Differential ratio	0.6~1.8	0.8~2.3	1~3	1.3~4
• Main feed shaft position				
• Main feed shaft				
	Eccentric shaft			

- (2) Stitch length can be increased by increasing the movement of the eccentric wheel.

Adjustment method

- ① Set the stitch pitch to zero.
② Unlock the stop screw, tighten or loosen the set screw to a desired stitch pitch, and lock the stop screw again.

Note: Make sure that the feed dogs are clear of the needle plate at the maximum differential ratio and maximum stitch length.

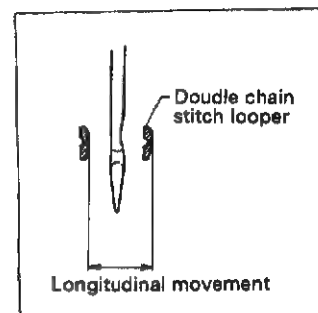


8. DOUBLE CHAIN STITCH LOOPER LONGITUDINAL MOVEMENT ADJUSTMENTS (Safety stitches only)

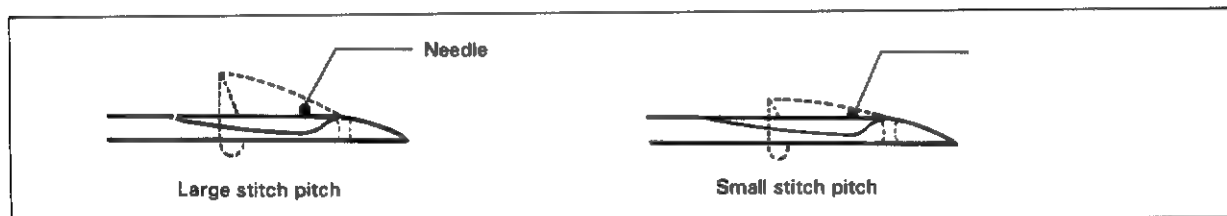
The double chain stitch looper's longitudinal movement may have to be changed depending on needle size, sewing conditions, etc.

(1) Needle gauge vs. longitudinal movement is as shown below:

Kind & Type of Needle	Needle Shank Diameter	Longitudinal Movement
DMX13 # 9	0.67	2.5mm (# 9 ~ #14)
" 10	0.72	
" 11	0.77	
" 12	0.82	
" 13	0.87	2.8mm (# 11 ~ #18)
" 14	0.92	
" 15	0.97	
" 16	1.02	
" 17	1.07	3.0mm (# 16 ~ #21)
" 18	1.12	
" 19	1.17	
" 20	1.22	
" 21	1.32	

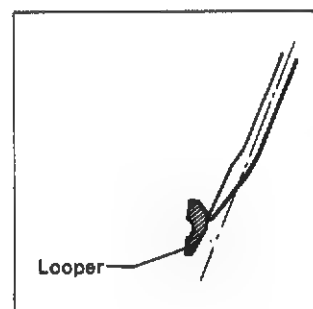


(2) Sewing conditions vs. longitudinal movement is as shown below:



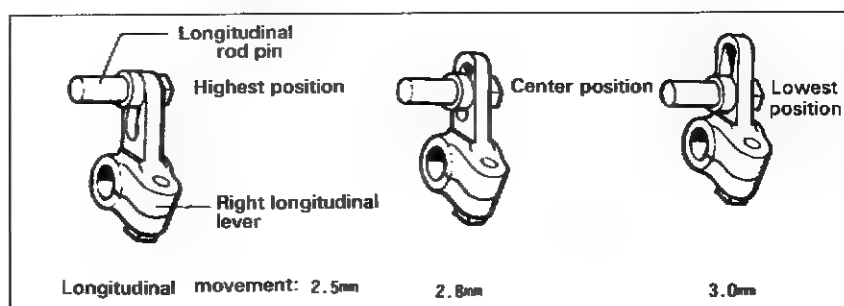
If the stitch pitch decreases, the triangle formed by the needle thread and looper thread becomes smaller, which may cause stitch skipping. In this case, decrease the longitudinal movement of the double chain stitch looper.

When sewing thick or hard fabrics, or fabrics that are partially thick, the longitudinal movement must be increased to prevent the needle from bending and the needle point from hitting the looper to become blunt or broken.



To adjust the longitudinal movement, set the right longitudinal lever as appropriate.

(3) Set position vs. longitudinal movement is as shown below:

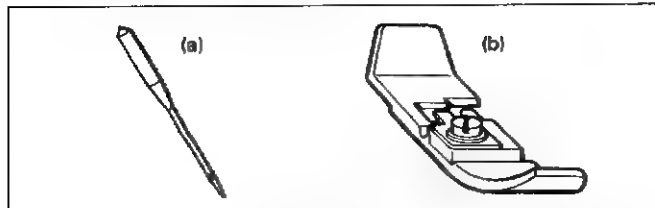


9. INSTALLING AND ADJUSTING VARIOUS DEVICES

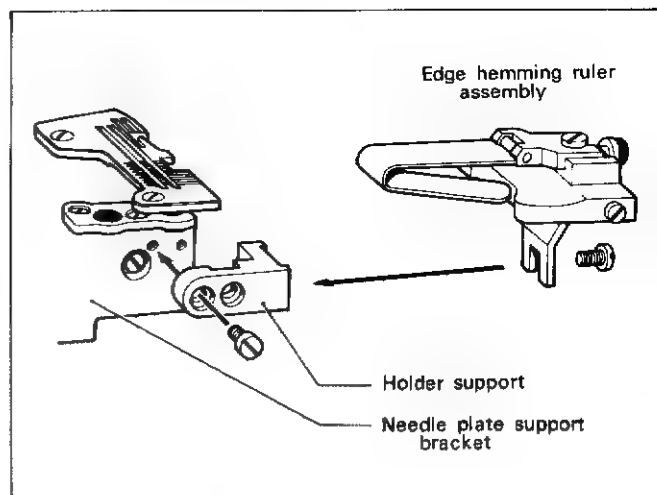
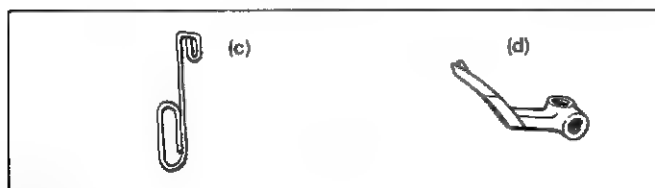
1 BLEND HEMMING: (Edge hemming ruler)

☆Parts requiring replacement

- For three threads: (a) Needle
(b) Presser foot assembly

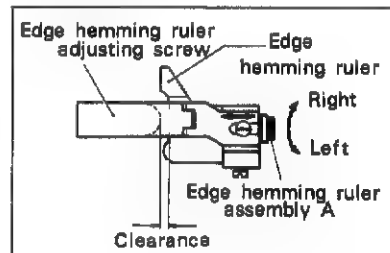
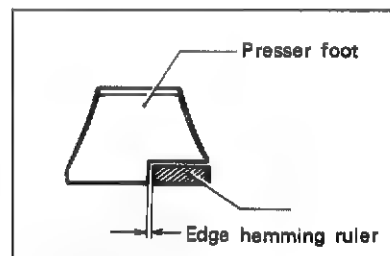


- For two threads: (a) Needle (b) Presser foot assembly
(c) Needle thread take-up (d) Looper



Procedures

- ① Replace the parts (a) and (b) for three-thread use, and the parts (a) through (d) for two-thread use, with those for blind hemming.
- ② Install the edge hemming ruler assembly on the needle plate support bracket with the holder support.
- ③ Move the presser foot to the right or left to adjust the clearance between the presser foot and the edge hemming ruler so that a cloth will easily pass.
- ④ Adjust the clearance between the edge hemming ruler A (assembly) and the edge hemming ruler to allow easy passage of the cloth.
- ⑤ Sew some stitches, and adjust the position of the edge hemming ruler by turning the edge hemming ruler adjusting screw.

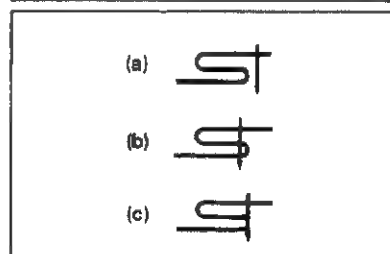


In case of (a)

Turn the edge hemming ruler adjusting screw clockwise to move the edge hemming ruler rightward to Position (c) shown in the figure at right.

In case of (b)

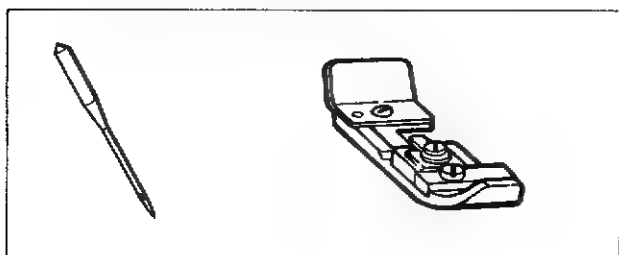
Turn the edge hemming ruler adjusting screw counterclockwise to move the edge hemming ruler leftward to Position (c) shown in the figure at right.



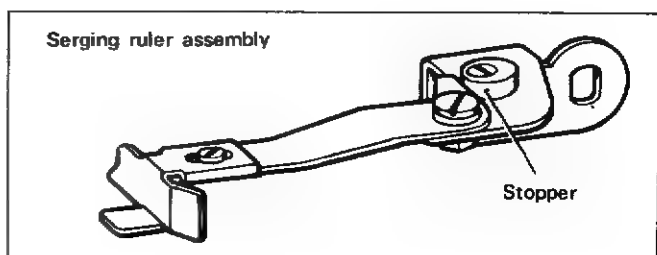
2 SERGING: (Serging ruler assembly)

☆Parts requiring replacement

- For three threads: (a) Needle (b) Presser foot assembly



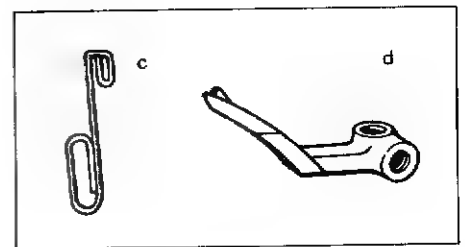
a. Serging ruler assembly



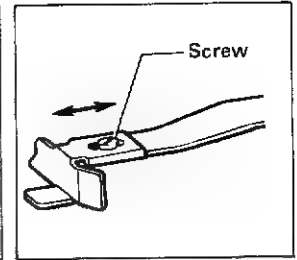
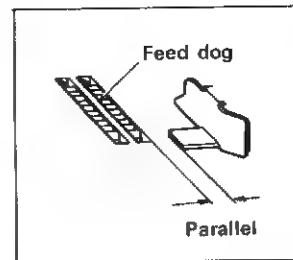
b. Stopper

Procedures

- ① Replace the parts (b) and (b) for three-thread use, the parts (a) through (d) for two-thread use, with those for serging.
- ② Install the serging ruler assembly on top of the front cover support assembly.
- ③ Turn the stopper until the serging ruler is parallel with the feed dogs.



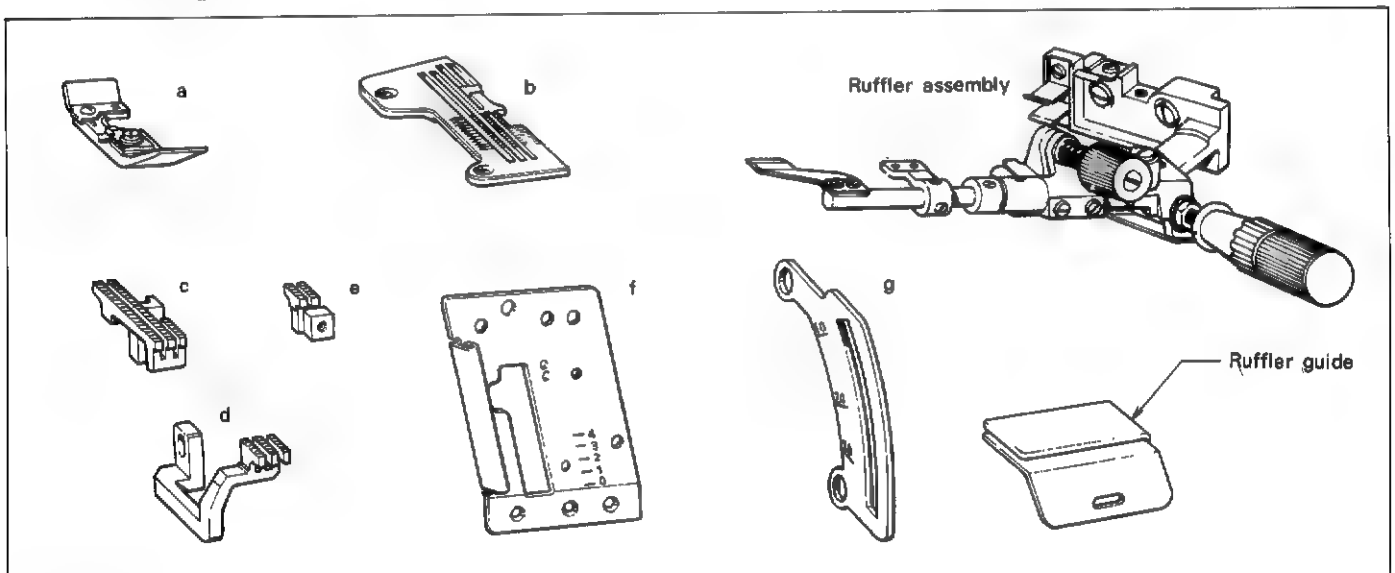
- ④ Actually sew some stitches, and move the serging ruler to the right or left until it matches the serging width.



3 RUFFLING: (Ruffler assembly)

☆ Parts requiring replacement

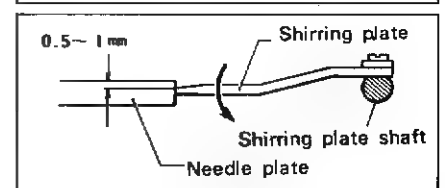
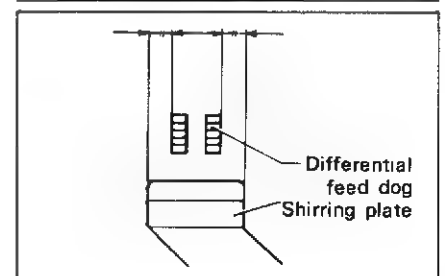
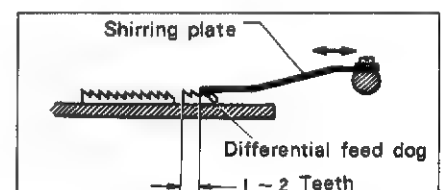
- a. Presser foot assembly b. Needle plate c. Main feed dog d. Differential feed dog
- e. Chaining-off feed dog f. Face plate g. Differential stitch control



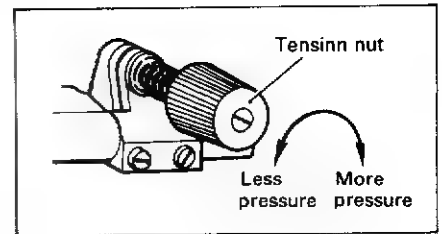
Procedures

- ① Lower the main feed shaft to the lowest position (Differential ratio 1 to 3).
- ② Replace the parts (a) through (g) in the above diagram with those for ruffling.
- * Only in case of overlock stitches, replace the cloth plate assembly, too.
- ③ Install the ruffler assembly on the front cover support assembly; and the ruffler guide on the cloth plate.
- ④ Install the differential adjuster assembly to bottom of the table. (See the next page.)
- ⑤ Position of shirring plate.

- Adjust the longitudinal position of shirring plate by moving it so that one or two teeth of differential feed dog will be out at the end of the feed stroke.
- Adjust the sidewise position of the shirring plate by moving shirring plate shaft so that the shirring plate will be symmetrical to the differential feed dog.
- Adjust the vertical position of the shirring plate by turning the shirring plate shaft so that the tip of the shirring plate will be 0.5~1mm below the top of needle plate.



- ⑥ Adjust the shirring plate pressure to 1 to 2kg with the tension nut.
The shirring plate pressure must be adjusted as suitable to the kind of fabric to be sewn. If the pressure is too small, the machine's differential ratio will vary from the actual differential ratio.
(This may result in an untidy or uneven gathering).



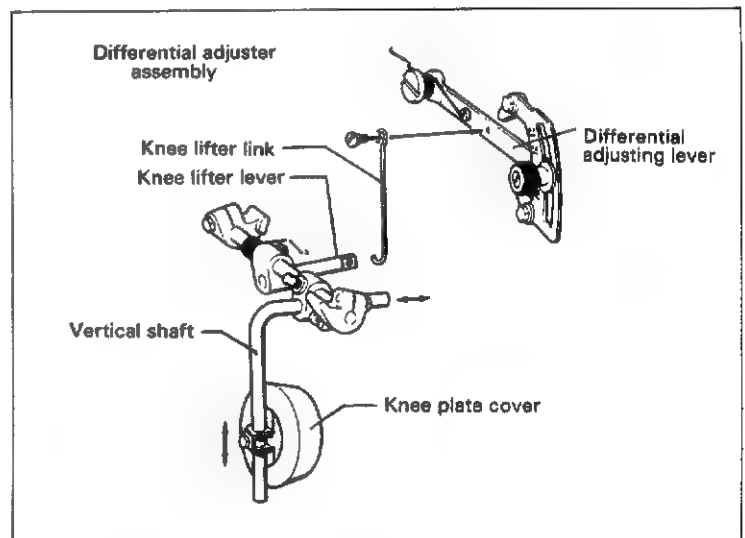
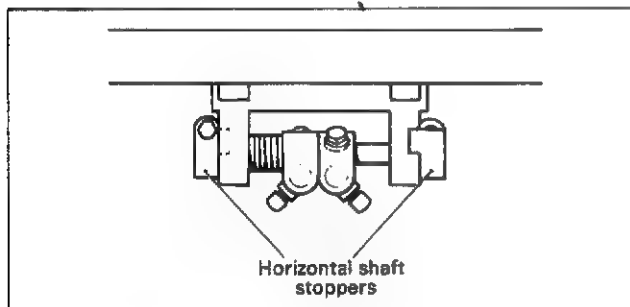
* The machine's differential ratio will be approximately the same as the actual differential ratio (that is, the actual gathering). Select the best differential ratio by referring to the table at right.

Material	Differential Ratio
General Material	1.5~2.0
Knitted Material	2.0~2.5

☆ Install the differential adjuster assembly

Procedures

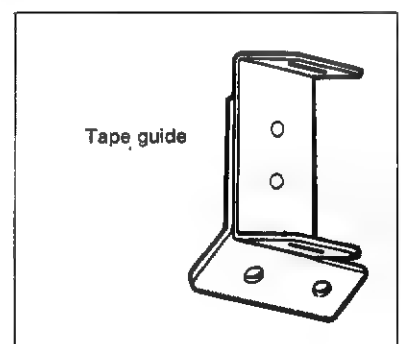
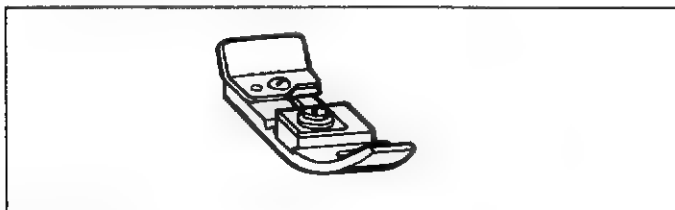
- ① Connect knee lifter link to differential adjusting lever.
- ② Install differential adjuster assembly to the bottom of the table.
- ③ Install knee lifter lever so its hole will be at the tip of the knee lifter link.
(Position in forward-backward directions)
Adjust its sidewise position by moving the knee plate lever in or out.
- ④ Adjust the vertical position so that knee plate cover will be at your knee when you are seated.
(Vertical position)
Adjust its sidewise position by moving vertical shaft in or out.
- ⑤ Adjust horizontal shaft stoppers so that the differential feed scale will not move in excess of the movable range.



④ TAPING: (Tape guide)

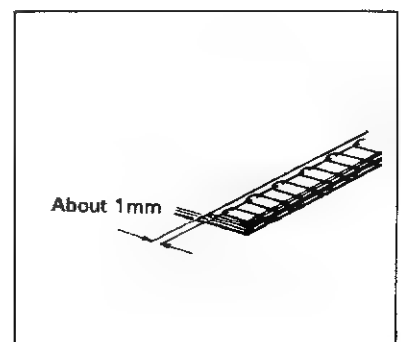
☆ Parts requiring replacement

- a presser foot assembly



Procedures

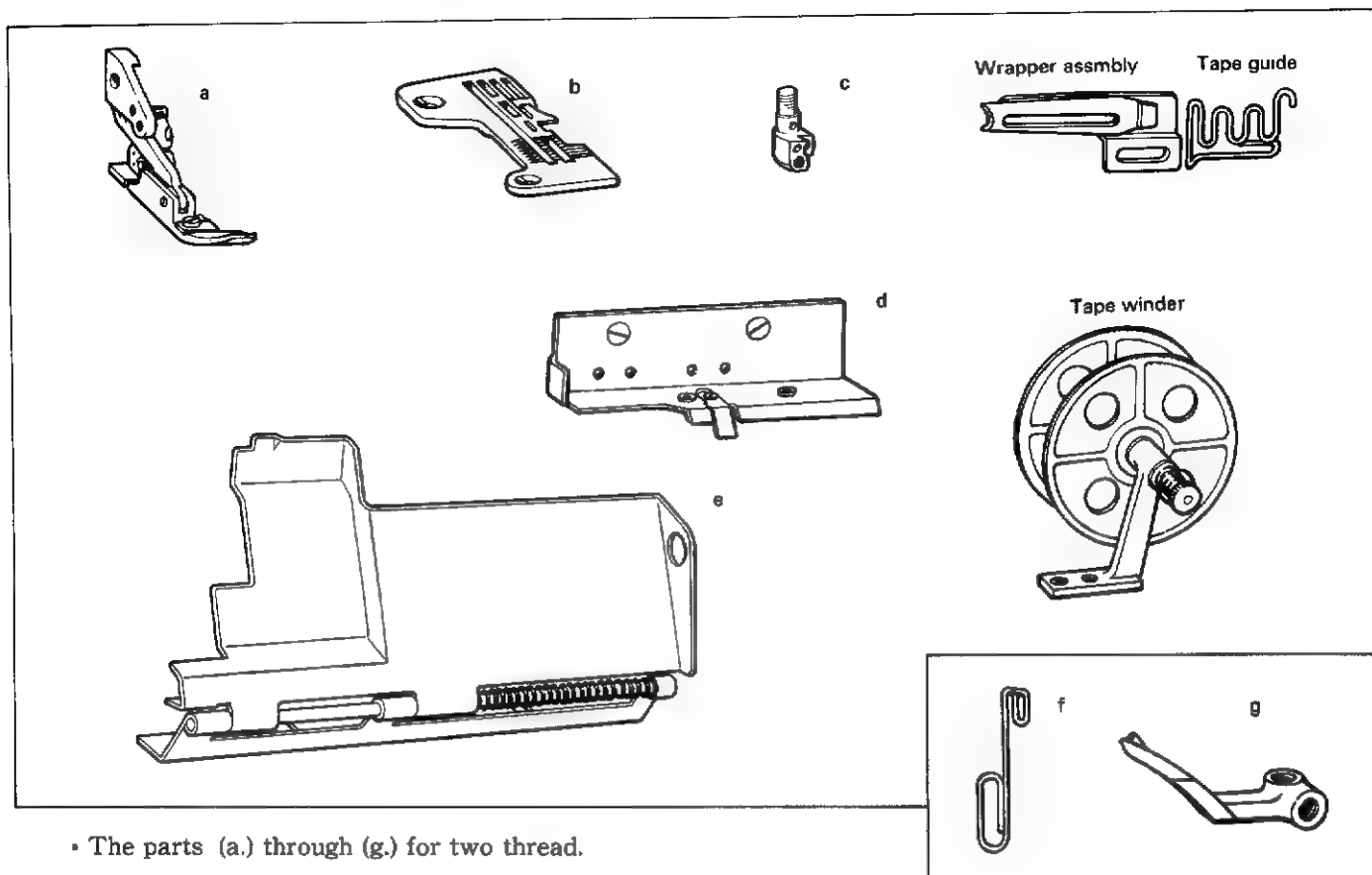
- ① Replace the presser foot assembly for taping.
- ② Install tape guide on the face plate cover.
- ③ Actually sew the work, and adjust the presser foot to the position where tape will be sewn.
* Adjust by moving the presser foot to the right or left so that the right edge of tape will not be cut by the knives and that the left edge of it will be about 1mm outside of the needle thread.
- ④ Select a tape winder which will increase as little tape tension as possible.



5 BINDING (Wrapper assembly, tape guide, tape winder)

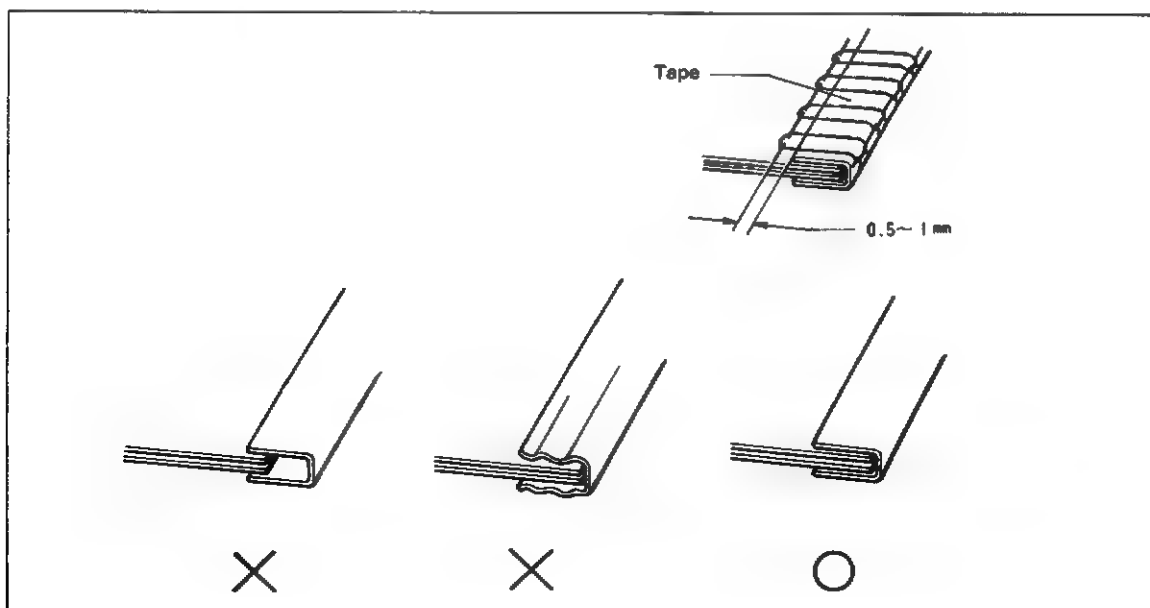
☆Parts requiring replacement

- For three thread (a~e):
 - a. Presser foot assembly b. Needle plate c. Needle holder d. Front cover supporter
 - e. Front cover assembly f. Needle thread tape-up g. Looper



Procedures

- ① Replace the above-shown three-thread parts (a) through (e) and two-thread parts (a) through (g) with the binding parts.
- ② Install wrapper assembly and tape guide on the front cover supporter.
- ③ Adjust the knife width so that tape will be entirely covered with stitches.

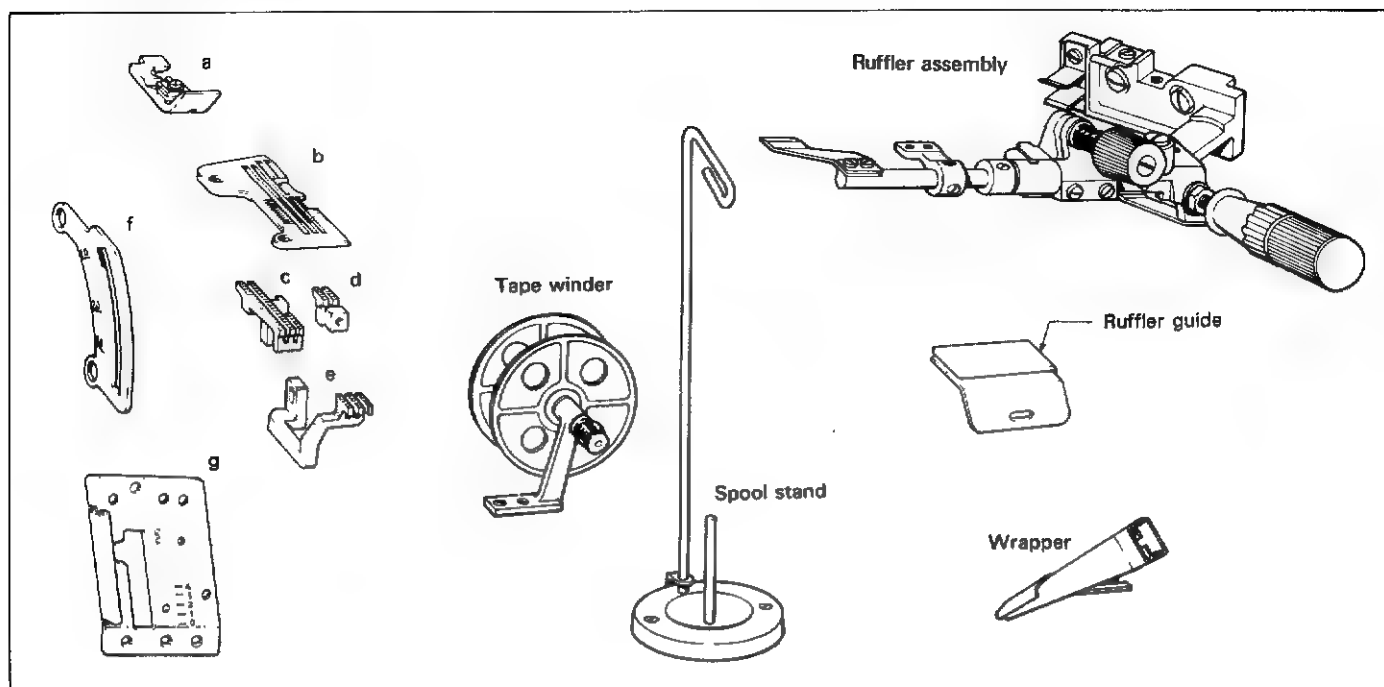


※Adjust the tape winder width so that the tape will move lightly.

6 PIPING (wrapper, ruffler assembly, tape winder, spool stand)

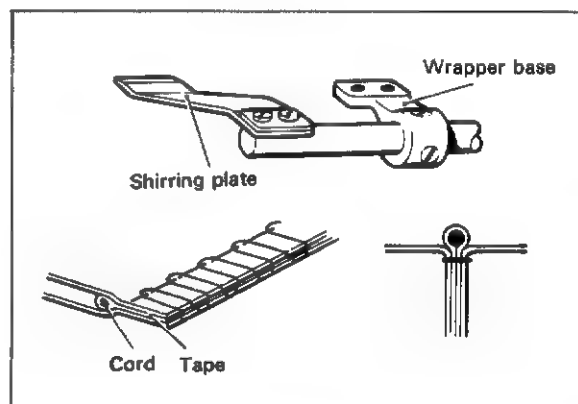
☆Parts requiring replacement

- a. presser foot assembly b. needle plate c. main feed dog d. differential feed dog
e. chaining-off feed dog f. differential stitch control g. face plate



Procedures

- ① Replace the above-shown parts (a) through (d) with the piping parts and the parts (e) through (g) with the ruffling parts.
*Only in case of overlock stitches, replace the cloth plate assembly, too.
- ② Install the ruffler assembly on the front cover supporter.
- ③ Remove shirring plate and install wrapper on wrapper base.
- ④ Make an adjustment by moving the presser foot and wrapper to the right or left so that tape and cord will not be slack when sewing.
*Adjust the tape winder width so that the tape will move lightly.



10. SEWING INSTRUCTION

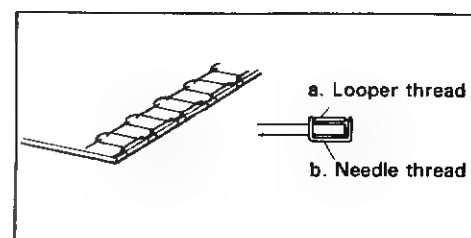
1 SINGLE-NEEDLE, TWO-THREAD

*Thread tension means the tension of the thread pulled in the running direction after the tension disc.

No	Cloth	Thread	Needle gauge	Differential ratio	Stitch pitch	Needle thread tension	Looper thread tension
1	Wool, polyester, thin trouser fabrics	Cotton #60/2	#11	1	3~3.6	18~28	8~18
2	Wool, polyester, medium-thick trouser fabrics	"	"	"	"	"	"
3	Knit fabrics, jersey	Wooly nylon	"	1~1.5	2~3	10~20	15~25

Note on Item 1:

Edges tend to curl when sewing thin materials. So decrease the hemming width (to about 3 to 4mm) and reduce the thread tensions to such an extent that the stitches will not be out of shape. Better stitches can be obtained by increasing the overlooper tension a little above the normal level.



Note on Item 2:

Edges will not curl when sewing medium-thick materials. Hemming width may be increased up to 6mm, and stitch pitch up to 3.6mm.

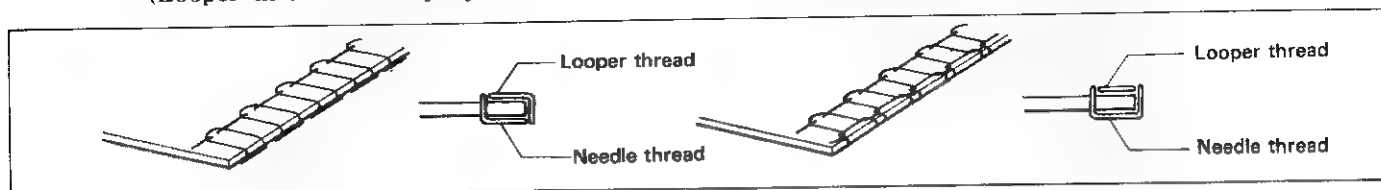
Note on Item 3:

If wooly nylon thread is used for both the needle and the loopers, or only for the loopers, cloth edges can be finished neatly.

The smaller the stitch pitch the better will be the finished stitches.

(Needle thread: Synthetic thread
Looper thread: Wooly nylon thread)

(Needle thread: Wooly nylon thread
Looper thread: Wooly nylon thread)



Even if wooly nylon thread is used as needle thread, there will be no skipped stitches because the thread tension is small.

But be sure to use a needle cooler because the thread may break due to heat.

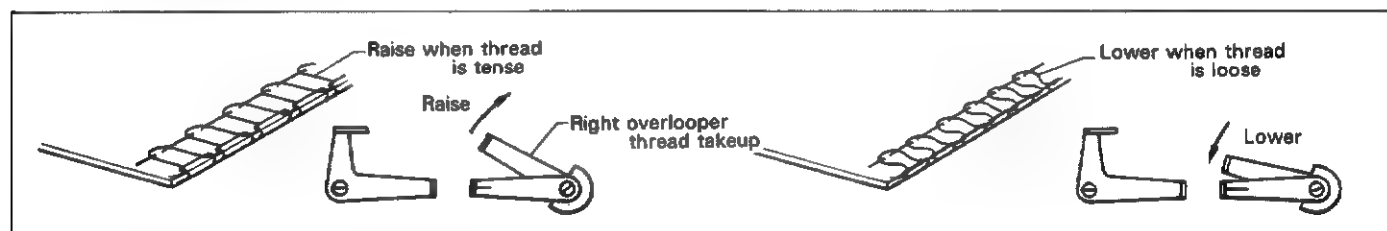
2 SINGLE-NEEDLE, THREE-THREAD

No.	Cloth	Thread	Needle gauge	Differential ratio	Stitch pitch	Needle thread tension	Overlooper thread tension	Underlooper thread tension
1	Knit underwear material	Cotton #60/2	#9	1~1.5	2~2.5	43~73	6~22	6~22
2	"	Synthetic #60	"	"	"	40~70	4~18	4~18
3	Thin knit fabrics	Synthetic #60	#11	1~2	2~2.5	40~70	4~18	4~18
4	"	Wooly nylon	"	"	"	30~50	4~15	4~15
5	Thick knit fabrics	Needle: Synthetic #60 Looper: Woolen	#14	2~3	2.2~2.8	50~80	4~15	4~15
6	Knit underwear material (Blind hemming)	Cotton #60/2	#9	1~1.5	2~2.5	15~25	8~15	22~32
7	"	Wooly nylon	"	"	"	10~20	2~10	6~18

Notes on Items 1 to 3:

Stitches will change when the overlooper thread takeup (right) is raised or lowered as shown below.

Be careful not to lower the thread takeup so much because stitches at high speed will become different at low speed or vice versa.



If the work becomes damaged:

◎ If the work becomes damaged:

1) Decrease the presser pressure to 2 to 3kg, or by about 12 to 15 screw threads.

A smaller pressure is effective for preventing work slipping in ordinary sewing, too.

2) Make the angle of the feed dogs less sharp.

When buffing the feed dogs, hold them horizontally.

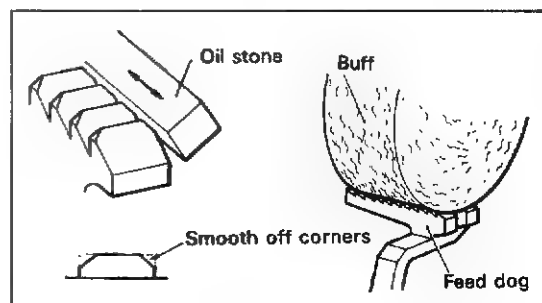
Remember not to buff them too much because excessive buffing will lower feed efficiency.

◎ If fiber breaks by needle

1) Use the needle cooler.

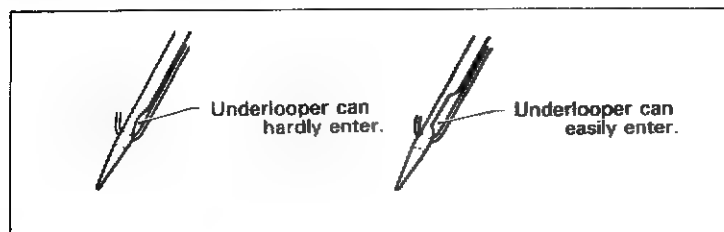
2) Use a smaller needle (selecting one in the range of #7 to #9).

3) Use a well-shaped light ball point (Schmetz), S-point (Organ), or knit needle KN (Organ).

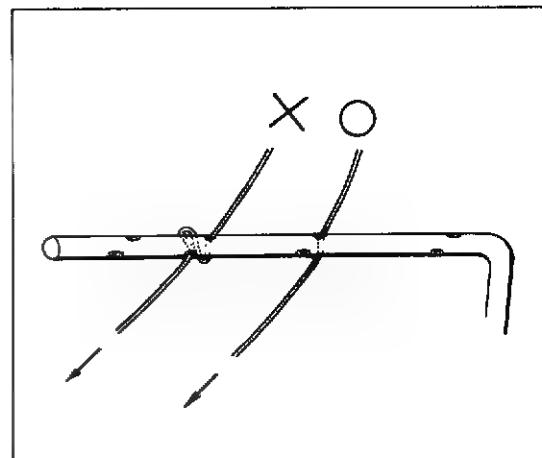


Note on Item 4:

When using wooly nylon thread for the needle, decrease the thread tension especially low. Stitch skipping is liable to occur, but can be effectively avoided by using a DC X27 needle.



Pass the thread through the two holes in the thread guide without winding.

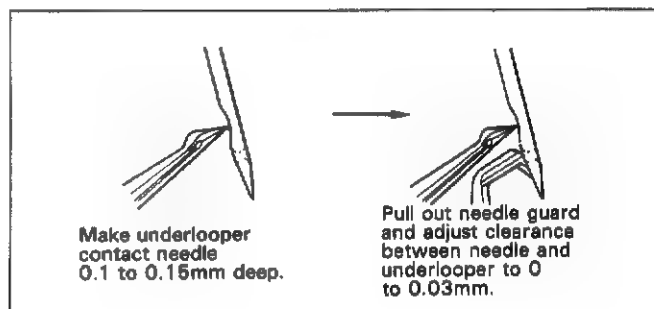
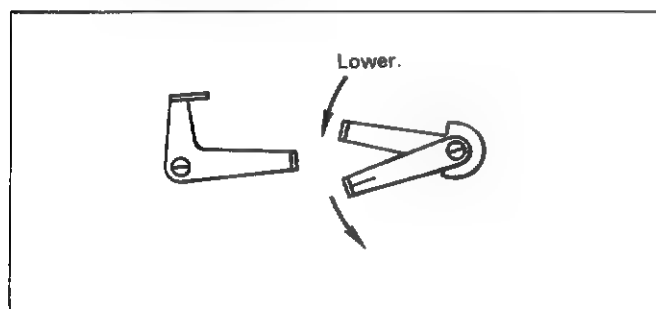


Note on Item 5:

Stitches tend to become loose on thick knitwork or rubber-interlaced parts. In that case, make an adjustment by lower the right overlooper and underlooper thread takeups.

◎ If stitches skip (Needle and underlooper):

- 1) Use a DC X27 needle.
- 2) Make an adjustment by only slightly bending the needle.

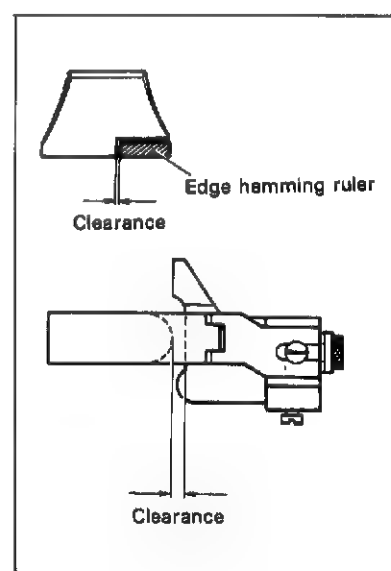


Note on Item 6: Precautions on blind hemming

- 1) Sew at constant speed.
- 2) Do not pull the work with your right hand. (If the work is pulled, stitches will be made away from the desired line.)
- 3) Push a thicker part of material under the presser foot with your left hand.

Machine adjustments:

- 1) Adjust the presser pressure to 2 to 3kg, or by about 12 to 15 screw threads.
- 2) Adjust the clearance between the presser foot and the edge hemming ruler so that the work will easily pass.
- 3) Adjust the clearance between the edge hemming ruler. A assembly's tip and the edge hemming ruler so that the work will easily pass.
- 4) Adjust hemming width by turning the edge hemming ruler adjusting screw.



Note on Item 7:

If wooly nylon is used for edge hemming, stitches will not skip because the needle thread tension is small. Pass the thread through the two holes in the thread guide without winding.

3 DOUBLE-NEEDLE, FOUR THREADS

No.		Cloth	Thread	Needle gauge	Differential ratio	Stitch pitch
Double-needle four threads	1	Knit underwear material	Cotton # 60/2	# 9	1~1.5	2~2.5
	2	Thin knitwork	Synthetic # 60	# 11	1~2	"
	3	Bulky material	Needle: Synthetic # 60 Looper: Woolen	# 14	2~3	2.2~2.8
Mock safety	4	Broadcloth	Cotton # 80	# 11	0.8~1	2~2.5
	5	Jersey	Polyester # 50	# 14	1.5~2	2.5~3

No.		Outer needle thread tension	Inner needle thread tension	Overlooper thread tension	Underlooper thread tension
Double-needle four threads	1	60~80	30~50	6~18	8~20
	2	40~60	25~45	4~16	6~18
	3	70~90	35~55	3~10	5~15
Mock safety	4	50~80	45~70	8~15	8~15
	5	50~70	25~50	10~20	8~18

Note on Item 1:

Cotton threads in the range of #60/2 to #70/2 are weak so that the thread tension must be reduced as much as possible. A poor quality thread tends to break. In that case, do not tighten the needle thread tension but adjust the positions of the thread takeup and thread guide if the thread tension must be increased.

Note on Item 2:

About the same tension may be used for sewing with synthetic and cotton threads.

Note on Item 3:

Make the same adjustment as mentioned in Item 5 for three threads.

Note on Item 4:

If the overlooper thread tension is too small, double-needle four-thread stitches may sometimes be made. In such a case, raise the overlooper thread takeup (right) to decrease thread delivery.

Note on Item 5:

When sewing jersey with chemical thread, it may break due to heat. So be sure to use the needle cooler.

Needle cooler performance is as follows:

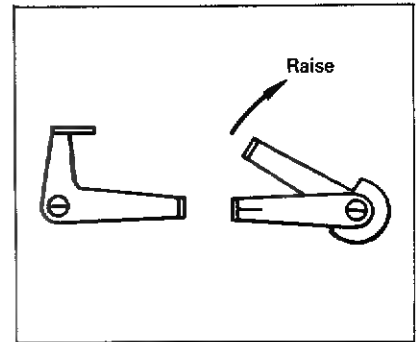
Cloth: Jersey

Thread: Polyester #50

Sewing speed: 6,000 spm

Needle gauge: #14

Sewable thickness: Fourfold, continuous



4 DOUBLE-NEEDLE, FIVE THREADS (Safety Stitches Only)

No.	Cloth	Thread	Needle gauge	Differential ratio	Stitch pitch
1	Broad cloth	Cotton #80	#11	0.8~1	2~2.5
2	"	Polyester #80	"	"	"
3	Jersey	Needle: Polyester #50 Looper: Wooly nylon	#14	1.5~2	2.2~2.8
4	Gaberdine	Cotton #50	#16	1	2.5~3
5	Denim	Cotton #50	#21	"	"

No.	Double chain stitch needle thread tension	Double chain stitch looper thread tension	Over needle thread tension	Overlooper thread tension	Underlooper thread tension
1	20~50	5~15	40~90	10~25	8~20
2	15~45	5~10	30~80	8~20	5~15
3	25~60	8~20	25~50	5~15	8~20
4	35~60	6~15	50~100	7~20	10~30
5	80~110	10~20	70~150	10~25	15~30

Note on Items 1 and 2:

Broadcloth tends to pucker so that the thread tension must be decreased as much as possible.

Use a single type presser foot for efficient feeding.

Note on Item 3:

If wooly nylon thread is used for double chain stitches, it can resist stretching up to 130 to 150%.

Jersey tends to deviate much so decrease the presser pressure (to 2 to 3kg) and use a double type presser foot.

Remarks: If a single type presser foot is used except when sewing thin materials, initial stitches may skip, the thread may break, and chaining-off thread break may occur.

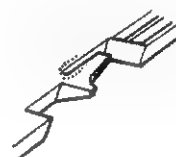
Note on Item 5:

Denim also tends to deviate much so that the presser pressure must be decreased to 2 to 3kg (by about 12 to 15 screw threads). Use needles for denim.

11. TROUBLE-SHOOTING

1 THREAD BREAK (Overlock Stitch Needle)

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	————→ Refer to "Threading diagram."	31
↓		
2) Excessive pressure of tension disc.	————→ Adjust to proper pressure.	
↓		
3) Poor thread quality.	————→ Use thread of good quality.	23
↓		
4) Needle groove or needle eye poorly finished.	————→ Change needle for a good one.	
↓		18 · 19
5) Wrong position of thread take-up.	————→ Adjust to proper position.	
↓		
6) Needle, looper, needle plate, or thread passage have flaws.	————→ Change its for new one or smooth surface with oil stone or buff.	19
↓		
7) Wrong timing of needle and looper.	————→ Adjust to proper timing, needle clearance and position of needle guard.	



• THREAD BREAK (Double Chain Stitch Needle)

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	→ Refer to threading diagram.	31
2) Excessive pressure of tension disc.	→ Adjust to proper pressure.	
3) Poor thread quality.	→ Use thread of good quality.	
4) Needle groove or needle eye poorly finished.	→ Change needle for a good one.	18 · 24
5) Wrong position of chain stitch needle thread guide.	→ Adjust to proper position.	
6) Wrong position of thread take-up.	→ Adjust to proper position.	18 · 21
7) Needle passage and double chain stitch looper have flaws.	→ Change the parts for a new one or smooth surface with oil stone or buff.	
8) Wrong adjustment of needle guard.	→ Adjust to proper clearance between needle and needle guard.	21
9) Wrong timing of needle and looper.	→ Adjust to proper timing.	21



② THREAD BREAK (Looper Thread)

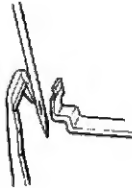


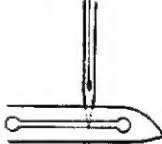
CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	→ Refer to threading diagram.	31
2) Excessive pressure of tension disc.	→ Adjust to proper pressure.	
3) Poor thread quality.	→ Use thread of good quality.	
4) Wrong position of looper thread take-up.	→ Adjust to proper position.	23
5) Thread passage and needle plate have flaws.	→ Change the parts for a new one and smooth surface with oil stone or buff.	18

4 SKIP STITCHING (Overlock Stitch)

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	————→ Refer to threading diagram.	
2) Excessive pressure of tension disc.	————→ Adjust to proper pressure.	31
※ In case skipping between overlooper and needle.		
1) Wrong position of looper thread take-up.	————→ Adjust to proper position.	23
2) Little movement into the left of over looper.	————→ Adjust the position of overlooper for proper movement.	20
3) Large clearance between needle and overlooper.	————→ Adjust over looper and under looper for proper clearance between needle and overlooper.	19 · 20
4) Incorrect height of needle bar.	————→ Adjust to proper height.	19
※ Incase of skipping between overlooper and under looper.		
1) Large clearance between under looper and over-looper.	————→ Adjust to proper clearance.	21
2) Top of overlooper blunt or bent.	————→ Change it for a new one or smooth with oil stone or buff.	20
※ In case of skipping between under looper and needle.		
1) Large clearance between under looper and needle.	————→ Adjust to proper clearance.	19
2) Top of under looper blunt or bent.	————→ Change it for a new one or smooth with oil stone or buff.	19
3) Wrong position of needle guard.	————→ Adjust to proper position.	19
4) Incorrect height of needle bar.	————→ Adjust to proper height.	19
5) Wrong timing of under looper.	————→ Adjust to proper timing.	19



• SKIP STITCHING (Double Chain Stitch)

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading/. ↓	————→ Refer to threading diagram.	
2) Excessive pressure of tension disc. ↓	————→ Adjust to proper pressure.	35
3) Wrong position of looper thread take-up. ↓	————→ Adjust to proper position.	24
※ In case of skipping on rightward movement of looper.		
1) Large clearance between looper and needle. ↓	————→ Adjust to proper position.	21
2) Wrong position of needle guard. ↓	————→ Adjust to proper position.	21
		
3) Top of looper blunt or bent. ↓	————→ Change it for a new one or smooth with oil stone or buff.	21
		
4) Wrong timing of double chain stitch looper. ↓	————→ Adjust to proper timing.	21
※ In case of skipping on leftward movement of looper.		
1) Large clearance between looper and needle. ↓	————→ Adjust to little movement of double chain stitch looper.	26
		
2) Wrong timing of double chain stitch looper. ↓	————→ Adjust to proper timing.	21
		

3 NEEDLE BREAK

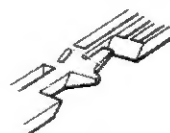
CHECK POINT	ADJUSTMENT	PAGE
1) Poor thread quality.	————→ Use thread of good quality.	
2) Needle size too small.	————→ Change it for more large one.	
3) Needle and looper out of proper relation.	————→ Adjust the position of needle guard and looper properly.	19 · 21
4) Wrong adjustment of needle guard.	————→ Adjust to proper position for needle guard.	19 · 21

4 IMPROPER THREAD TENSION

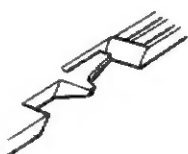
CHECK POINT	ADJUSTMENT	PAGE
1) Poor thread quality.	————→ Use thread of good quality.	
2) Needle size too small.	————→ Change it for more large one.	
3) Too weak pressure of tension disc.	————→ Adjust to proper pressure.	31
4) Wrong position of thread take-up.	————→ Adjust to proper position.	23 · 24

5 WRONG CHAINING-OFF (Overlock Stitch)

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	————→ Refer to thread diagram.	
2) Excessive pressure of tension disc.	————→ Adjust to proper pressure.	
3) Too weak pressure of tension disc.	————→ Adjust to proper pressure.	31
4) Wrong position of looper thread take-up and needle thread take-up.	————→ Adjust to proper position.	23 · 18
5) Wrong installment of chain feed dog.	————→ Adjust to proper position.	23
6) Needle plate has flaws.	————→ Change it for a new one, or smooth with stone oil and buff.	18
7) Wrong timing between needle and looper.	————→ Adjust to proper timing.	19 · 20



• **WRONG CHAINING-OFF (Double Chain Stitch)**

CHECK POINT	ADJUSTMENT	PAGE
1) Wrong threading.	————→ Refer to threading diagram.	35
2) Excessive pressure of tension disc.	————→ Adjust to proper pressure.	
3) Too weak pressure of tension disc.	————→ Adjust to proper pressure.	
4) Wrong position of thread guide.	————→ Adjust to proper position.	18
5) Wrong position of looper thread take-up.	————→ Adjust to proper position.	24
6) Wrong installment of main feed dog and differential feed dog.	————→ Adjust installment with the same level.	23
7) Existence of clearance on the pressing part for chaining off of presser foot.	————→ Change it for a new one.	23
		21
8) Wrong timing between needle and looper.	————→ Adjust to proper timing.	

6 EXCESSIVE WRINKLES

CHECK POINT	ADJUSTMENT	PAGE
1) Excessive pressure of tension disc.	————→ Adjust to proper pressure.	31
2) Needle size too big.	————→ Change it for a proper one suitable to needle and materials.	
3) Wrong differential ratio.	————→ Adjust to proper ratio.	
4) Bight too wide.	————→ Adjust to proper bight.	14 · 25
5) Knives are not sharp.	————→ Change it for a new one or reglind.	22

7 SLIPAGE OF CLOTH

CHECK POINT	ADJUSTMENT	PAGE
1) / Excessive pressure of pressure foot.	————→ Adjust to proper pressure.	22
2) Knives are not sharp.	————→ Change it for a new one or reglind.	
3) Feed dog too high.	————→ Adjust to lower level than standard level.	23

MEMO